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PEHPL Newsletter

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Overview of the PEHPL Programme



PEHPL Scholar Andrew Chota collecting blood sample from a goat

implementing applied multidisciplinary projects in socio-economics and food security.

93% of all PEHPL scholars' research is directly targeting smallholder farmers

The Program for Enhancing the Health and Productivity of Livestock (PEHPL) is an initiative funded by the Bill and Melinda Gates Foundation and implemented by the Nelson Mandela African Institution of Science and Technology (NM-AIST), Arusha, Tanzania in collaboration with Washington State & Penn State Universities, USA, and the University of Glasgow & Scotland's Rural College, UK.

Objectives

To develop a technical base for PhD research and training at NM-AIST that will allow the next generation of African scientists to deliver practical and effective interventions in animal health and production, and improvements in livestock management practices. To enhance the livelihoods of smallholder livestock keepers in sub-Saharan Africa by

Expected program outputs

By 2018 a total of 16 PhD graduates will be trained in multidisciplinary areas of animal health and livestock production targeting safeguarding of animal welfare, public health and the environment in Sub-Saharan Africa.

Enhanced research capacity in livestock production and health at NM-AIST.

Improved household food and nutrition security, income and social well being of resource livestock farmers through adoption of better livestock management practices.

56% of all PEHPL scholars are females



PEHPL Scholar, Suzan Kerfua collecting samples during an FMD outbreak

PEHPL in Perspective: Progress, Achievement and Challenges

Students Recruitment

The program recruited 16 PhD students from northern universities and the Sub-Saharan Africa. Out of the 16 students, 9 are females and 7 were males.

Proposal defense

All southern (Sub-Saharan Africa) program students underwent a mandatory proposal defense as per NM-AIST requirements. All research proposals eventually passed for continuation into the research phase.

Coursework and research

Students have completed their coursework and are currently engaged at various levels of their research

Short courses, permits and visits

Various students attended several short courses organized by the program such as; PCR training (at NM-AIST) Summer School 2016 One Health Training by the University of Glasgow Econometric training by the Washington State University In addition, some scholars had opportunities to attend externally organized short courses.

Project web-page and poster

The project has successfully launched a web-page: www.pehpl.net which provides various pieces of information about the program as well as students and mentors.

An official poster for the project was designed, developed and approved and is currently used for various advertisement purposes by the partner universities.

Procurement of laboratory equipment

The project has facilitated the procurement of various laboratory equipment that are vital for carrying out research. Such equipment include;

- One Biosafety cabinet
- One -80 degrees Celsius freezer
- One -20 degrees Celsius freezer
- Two solar freezers
- One PCR machines

Students Research Testimonials



Name: Patrick Ongadi Mudavadi
Institution: NM-AIST

Research title: Farmer-led breeding and feeding decisions for overcoming seasonality driven milk fluctuations in smallholder dairy farms

Why is Patrick doing this research?

This research seeks to propose innovative farmer-led feeding and breeding interventions to overcome the main challenge in the production phase of the smallholder dairy value chain, which is the continuous seasonality driven fluctuation (or “flush season syndrome”) of milk production and supply.

Expected outputs:

1. Thesis and refereed journal publications
2. A model that optimizes milk production given existing farmer-led breeding and feeding decisions in smallholder dairy farms
3. Innovative interventions for increasing the smallholder dairy farmer and industry capability to manage the implications of seasonality driven milk fluctuations

How has the PEHPL transformed Patrick?

The PEHPL team is institutionally diverse, working with multi-stakeholders in a multi-cultural environment determined to propose innovative solutions to address health and productivity challenges of the smallholder livestock farmer. I am honored and motivated to be a part of the transformative, inaugural cohort of PEHPL fellows.

Project Matrix of Deliverables:

- Quality of research output
- Peer bonding among the students
- Sustainability of research beyond programme



PEHPL in Perspective: Progress, Achievement and Challenges



Name: Catherine Herzog
University: Penn State University
Research title: Transmission Dynamics of *Peste des Petits Ruminants* Virus (PPRV) in Northern Tanzania

Why is Catherine doing this research?

To improve the understanding of *peste des petits ruminants* virus transmission patterns and economic impact in Northern Tanzania and provide insights to inform vaccination campaign strategies and livestock management practice reforms.

Expected outputs:

1. Knowledge of epidemiology of *peste des petits ruminants* virus in sheep, goats, and cattle in Northern Tanzania through large serosurvey and questionnaire
2. Identify specific livestock management practices that may increase *peste des petits ruminants* virus transmission
3. Improved understanding of the conditions under which *peste des petits ruminants* virus will persist in Northern Tanzania

How has the PEHPL Program has transformed Catherine

“The PEHPL students and mentors are highly motivated and engaged. In this environment, great collaborations and important, exciting research questions can be addressed. These research projects will lead to important discoveries that will improve the situation for livestock in the country. I am thrilled to be a part of the inaugural cohort of fellows.”



Name: Kelvin Ngongolo
Institution: NM-AIST
Research title: Linking Human Activities, Livestock Movement and Ecological Factors with Vulnerability to Trypanosomiasis in the Maasai Steppe

Why is Kelvin doing this research?

Trypanosomiasis of socio-economic important to small holder pastoralists because it causes death to livestock.

Little is known on how human activities, animal movement patterns as well as ecological factors in the Maasai steppe influence prevalence of animal Trypanosomiasis

Expected outputs:

1. The prevalence of trypanosomes to cattle in the context of complex ecosystem of human livestock Wildlife will be determined.

2. The findings will be helpful in developing strategies for controlling the vectors and the diseases.

3. Increase in yield, Quality, Income and Food security and Poverty alleviation to small livestock keeper.

How has the PEHPL transformed Kelvin?

It has been great opportunity to be part of PEHPL program. Through, this program, I have developed my skills and knowledge on Control strategies for Trypanosome infection to cattle of small livestock in the complex ecosystem. In addition, the program has provided me an opportunity to get linked with international scientists who are well experienced in livestock diseases.

Furthermore, the program, has equipped me to be among the champion and stakeholder for the control of trypanosomiasis in Tanzania.



Name: Rhoda Aminu
University: University of Glasgow
Research title: Development of surveillance and typing schemes for anthrax epidemiological studies in endemic areas.

Why is Rhoda doing this research?

Many communities where livestock is the main source of livelihood in my study area, are affected by anthrax. My preliminary results show that the

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disease has considerable health and livelihood implications for these people, highlighting the need to control the disease.

Expected outputs:

1. To understand the anthrax situation (including the impacts on livestock and human health and the practices that put people and animals at risk) in the Ngorongoro Conservation Area
2. To improve reporting and surveillance through community participation
3. To implement improved diagnostic test for areas with limited infrastructure.

How has the PEHPL Program transformed Rhoda?

The Bill and Melinda Gates Foundation funded PEHPL program brings together students and mentors who are experts in their fields, from different parts of the world to study important problems relating to developing countries, it is quite rewarding from a personal standpoint to be a part of the cohort. The program has given me the opportunity to advance my career goals.



Name: Andrew Claud Chota (BVM, Msc. MBB – SUA)

Institution: Nelson Mandela Institution of Science and Technology – NM-AIST

Research title: Epidemiology and Diagnostic Accuracy of diseases with respiratory signs in Domestic small ruminants in Tanzania

Why is Andrew doing this research?

Diseases with respiratory signs cause significant losses in small ruminants (sheep and goats). Similarity in epidemiology, clinical manifestation, and pathological features leads in partial or misdiagnosis and hence inaccurate reports to the responsible authorities responsible for policy making on control strategies. This partial and misdiagnosis in turn results in incorrect management and control strategies.

Expected outputs:

This study will come up with

1. Epidemiological information on the diseases of emphasis namely Contagious caprine pneumonia (CCPP) and Peste des petits ruminants (PPR).
2. Information on how accurate the reports on diseases with respiratory signs in sheep and goats are, this is important for policy making.
3. Information on the level of infection and co infection of selected pathogens involved in outbreaks and isolates for repository.

How has the PEHPL transformed Andrew?

Being in the PEHPL program has helped me a lot. I have added knowledge on very important subjects

such as, law, entrepreneurship and research methodology, these are very important in designing research that provide results that can be translated into business that can be protected by the laws. I have also had an opportunity to get training on various disciplines like data analysis using R, QGIS, experimental designs, Use of GPS, scientific writing, challenges in ecology of infectious diseases dynamics and questionnaire development.



Name: Zoë Campbell

University: Washington State University, Allen School for Global Animal Health

Research title: Newcastle disease vaccine adoption at the smallholder household level in Tanzania: Identifying determinants and barriers

Why is Zoë doing this research?

Chickens are an essential part of many households in Tanzania, but disease keeps people from taking full advantage of their chickens. This research will identify factors at the household level that enable farmers to vaccinate or prevent them from vaccinating their chickens against Newcastle Disease.

Expected outputs:

Expected outputs include a list of determinants of and barriers to households using Newcastle Disease

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vaccine for their chickens, an estimate of household willingness to pay for the vaccine, and recommendations for interventions that could help more smallholder farmers access and adopt vaccines for their chickens.

How has the PEHPL Program transformed Zoë?

When I left Tanzania in 2014 after living in a rural community for two years as an environmental extension officer, friends and neighbors assured me that “Milima haikutani, lakini wanadamu hukutana.” Mountains don’t meet, but people do.” The opportunity to return to that community of friends and neighbors and continue development work that is informed by research is an incredible gift. It is and continues to transform who I am as a scientist and as a person.



Name: Divine Ekwem

University: University of Glasgow

Research title: The determinants of foot-and-mouth disease (FMD) virus circulation in livestock populations in northern Tanzania

Why is Divine doing this research?

My research findings will not only underpin the control of endemic FMD in Tanzania, but has also the potential

to identify key transmission routes that would be important to reduce the threat of trans-boundary spread.

Expected outputs:

1. Develop a database of livestock movement networks in northern Tanzania.
2. Improving community-based surveillance approaches using simple diagnostic technology such as lateral-flow-device (LFD) to detect FMD virus strains in northern Tanzania.
3. Provide some understanding on how FMD spreads locally to inform control options

How has the PEHPL Program transformed Divine?

Support received through the PEHPL has enabled me to be embedded in a research project that has allowed me to acquire knowledge and gained relevant skills required to become a good scientist. In addition, the network of student cohort has created a platform for sharing ideas and potential future collaborations.



Name: Emma Peter

Institution: Nelson Mandela African Institution of Science and Technology

Research title: Screening, Characterisation and genome sequencing of sylvatic and

outbreak African Swine Fever Viruses in zones of Tanzania

Why is Emma doing this research?

The main target of PEHPL is to improve the health and productivity of Livestock with a direct impact on smallholder farmers who are mainly women and children. I am doing this project as it is in line with this target.

Expected outputs:

1. Information on ASFV as a baseline for other studies.
2. Evidence based control with impact on improvement of lives, poverty reduction, nutritional status and food security
3. A PhD thesis and three papers on peer reviewed journal

How has the PEHPL Program transformed Emma?

Good supervision, excellent mentorship and availability of all education and research requirements ranks PEHPL on top of many other programs. This has so much impact on me as a young scientist who is building her capacity. The confidence I am gaining to do science with impact and the privilege to interact with world class scientists have raised my ability as a young scientist.



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Name: Fulgence N. Mpenda

Institution: Nelson Mandela African Institution of Science and Technology - (NM-AIST)

Research title: Molecular Basis of Variation in Susceptibility to Newcastle Disease Virus in chickens

Why is Fulgence doing this research?

Newcastle disease (ND) is highly devastating disease in chicken production with a mortality estimated to be 100% if occurs in naïve population. Available disease control strategies such as vaccination and biosecurity measures lack feasibility, particularly in poor rural communities where chickens are left to scavenge for their nutritional needs. This suggesting searching for robust and effective control strategy like developing resistant chicken to NDV. The purpose of this research is to evaluate phenotypes that are associated with chicken variation in susceptibility to NDV, and establish whether chicken variation in susceptibility to NDV is associated with their genomic structural variations. The research will have significant contribution in an endeavor of breeding out susceptible chicken to NDV.

Expected outputs:

Candidate genes/genomic regions associated with NDV resistant will be identified.

How has the PEHPL Program transformed Fulgence?

I am very proud to be part of PEHPL family. PEHPL has offered me an opportunity to get interaction with my fellow PhD students and mentors from across the globe exchanging ideas and expertise. This has created a room for developing a collaborative research, which will not only have a profound impact in my academic development but also in my future career as scientist and researcher. Is through PEHPL collaboration framework enabled me to be part of Robert S. MacNamara Fellow for which I am going to stay at Pennsylvania State University (PSU) for almost eight (8) months doing research.



Name: Aluna Chawala

University: Scotland's Rural College and The University of Edinburgh

Research title: Investigation of farmer-led breeding goals and strategies in smallholder dairy farming systems to cope with variation in feed sources and quality

Why is Aluna doing this research?

Genetic improvement of breeding programmes in sub-Saharan Africa tends to be either government or project driven with a main focus of upgrading local breeds.

As a result most prior attempts to establish breeding programmes have collapsed. Our hypothesis is that the mismatch between what traits farmers consider valuable and appropriate in their production environment on the one hand, and government policies and priorities, on the other lead to this collapse.

This study investigates the dairy breeding goals, farmer-priority traits for sustainable dairy production in Tanzania.

Expected outputs:

1. Identified farmer-led breeding goals and strategies will contribute to the current efforts on developing options for genetic improvement strategies for smallholder dairy production systems.
2. Results will contribute to the body of knowledge on breeding and genetics in smallholder dairy production systems
3. Application of appropriate breeding strategies informed by the current study is expected to increase the productivity per cow.

How has the PEHPL Program transformed Aluna?

My personal career objective has been to use my academic knowledge to contribute in the rural sector development, where agriculture and livestock is the main source of livelihood.

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The PEHPL program has pushed my dream further toward being an independent researcher. I can see myself becoming a professional livestock research scientist. I will be able to use the knowledge acquired through my PhD to help farmer's in rural areas to increase their livestock productivity



Name: Gladness George Mwanga
Institution: Nelson Mandela African Institution of Science and Technology - NM-AIST
Research title: Information processing model for enhancing decision making by small scale dairy farmers

Why is Gladness doing this research?

Farmers have been making uninformed decisions, while on the other hand little information about the farm is known to policymakers and other livestock stakeholders. As a results technologies or decisions they propose to farmers have low adoption rate which at the end effect productivity.



PEHPL researcher with farmers

Expected outputs:

1. An intelligent tool that will be used by policymakers and other livestock stakeholders will be able to identify factors and challenges that influence/hinder farmers to make decisions.
2. The adaptive decision prediction algorithms and a user-friendly tool to be used by farmers in managing their farms.
3. Moreover, the data collection and analytical tool that will be implemented on the farm will facilitate decision making by small-scale dairy farmers.
4. Publications on a new model for decision making in small scale dairy industry.

How has the PEHPL Program transformed Gladness?

First, it has changed my thinking. I used to believe nothing much can be done on issues related to ICT in agriculture especially livestock sector. Through interactions with my colleges and livestock experts for PEHPL project made me realized that there are a lot of things that I can do with my ICT skills to facilitate decision making to both farmers and other livestock stakeholders.



Elifuraha Barnabas Mngumi

Name: Elifuraha Barnabas Mngumi

Institution: Nelson Mandela African Institution of Science and Technology
Research title: Characterization of Newcastle disease virus strains (NDV) and metagenome analysis for understanding the importance of co-infections in Tanzanian local chickens

Why is Elifuraha doing this research?

Newcastle disease (ND) remains to be an important constrain for health and productivity of local chickens in Tanzania. The present study objects into the understanding of the strains of NDV and associated co-infections circulating in local chickens. The information will help in devising options for improving the control of the disease

Expected outputs:

1. Prevalence of NDV in chickens determined
2. Genotypes & whole genome sequencing circulating NDV in chickens determine
3. Frequency and nature of co-infections associated with ND determined

How has the PEHPL Program transformed Elifuraha?

It is through PEHPL that I was able to use advanced molecular techniques for ND research; which in the near future and for the first time in Tanzania, will enable sequence of the virus and associated co-infections

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Name: Kerfua Susan Diana
Institution: Nelson Mandela African Institution of Science and Technology - NM-AIST
Research title: Economic impact and epidemiology of foot-and-mouth disease (FMD) in districts located at the Uganda and Tanzanian border

Why is Kerfua doing this research?

FMD is endemic in Uganda and Tanzania, with scanty information on its economic impact and epidemiology at the border regions. Such information is essential for feeding into the Progressive Control pathway, an avenue for regional and global control and eradication of FMD

Expected outputs:

1. Foot-and-mouth disease virus sequences in genbank.
2. At least three publications.
3. At least one newspaper article.

How has the PEHPL Program transformed Kerfua?

PEHPL has provided a chance and privilege for me to be pursue further studies (PhD), which I believe, will be impactful to my country.

I have been able to tap the wisdom, knowledge and skill from PEHPL leadership, mentors and supervisors which is helping me in studies and in my general life

PEHPL program has provided me with chance to attend conferences and meetings that have fostered connections with other scientists in my field of study. This has greatly boosted my knowledge and connections.

The diversity of PEHPL fellows has provided a learning and sharing ground for me.



Name: Bridgit Muasa Syombua
University: Scotland Rural University College (SRUC) of Edinburgh
Research title: Monitoring the reproductive status of dairy cows using cow-side estrus detection technologies

Why is Bridgit doing this research?

In most parts of Africa, dairy cows are one of the most valuable resource for farming families but their potential is yet to be optimized, this is especially so for small holder dairy farmers. With increasing pressure for arable land and demand for sustainably produced animal products, there is need to improve the reproductive efficiency of dairy cows. My research work will seek to investigate ways of improving the reproductive performance of dairy cattle in the tropics using estrus

detection aids.

Expected outputs:

Enhanced estrus detection will lead to improved conception rates, reduced calving intervals and increased lifetime productivity of the cows. This ensures that farmers in the tropics are able to gain more from their investment in dairy cows.

Outputs: Appropriate estrus detection aids (EDT's) for dairy farmers in the tropics Identified and documented

Outcomes:

With enhanced estrous detection there will be:

- Increased conception rates.
- Reduced services per conception.
- Increased lifetime milk production leading to increased milk sales.
- More calves sold.
- Fewer cows culled.

Impacts:

- Increased incomes
- Improved Livelihoods

How has the PEHPL Program transformed Bridgit?

Being part of the PEHPL program has broadened my professional network by introducing me to a group of respected scientist in my field that have served as mentors in my PhD journey. PEHPL program has also allowed me to interact with students from diverse backgrounds and fields, creating an opportunity to exchange ideas and learn from their best practices.



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Name: Megan Schilling
University: Penn State
Research title: Genetic mechanisms of resistance to Newcastle Disease Virus in Locally Adapted Chicken Ecotypes of Tanzania

Why is Megan doing this research?

Newcastle Disease Virus is an important poultry pathogen especially in Sub-Saharan Africa due to infection causing high mortality rates in backyard poultry. Uncovering mechanisms of resistance will help to inform breeding strategies and increase productivity of chickens for smallholder farmers.

Expected outputs:

1. Determine the variation in the innate immune gene expression between different chicken ecotypes
2. Validate if this variation is associated with differences in susceptibility to NDV
3. Assess if the innate immune variation could be assessed in the developing chick embryo

How has the PEHPL Program transformed Megan?

The PEHPL program has transformed me into a more well-rounded and versatile scientist through developing collaborations with African scientists to help alleviate real problems in Sub-Saharan Africa to help make a difference for those living there.



Name: Ashley Railey
University: Washington State University
Research title: Identification of household management for foot and mouth disease control in northern Tanzania

Why is Ashley doing this research?

Foot and mouth disease (FMD) persistently affects livestock in Tanzania, decreasing animal productivity in the short and long term. With increasing advances in FMD control, we need a closer look at household decision-making towards control options.

Expected outputs:

1. Identify the determinants of household willingness to pay for FMD vaccinations
2. Define how household and community factors explain preferences for improved vaccine information

through diagnostic testing
3. Examine the impact of FMD control measures on livestock productivity and household expenditures

How has the PEHPL Program transformed Ashley?

PEHPL has enhanced my resourcefulness, including being flexible and embracing all experiences. The uniqueness of this program in coordinating research between institutions across continents means spending time in Tanzania and America, as well as presenting and networking everywhere in between. Unique challenges occur in any country or stage of research. To adapt to these varying environments, I have learned to trust my judgements, while being open to inputs of those around me. This includes letting the village kids teach you Swahili, going to a presentation from a Nobel laureate, listening to veteran researchers share insights during a safari, knowing who makes the best tea, or where you can find your advisor mid-afternoon (his office or coffee shop). Any situation can provide research or life insights, you just have to be flexible and open. Along these lines, I have learned to trust my own abilities. The varying perspectives from working in both America and Tanzania can provide important insight. At the end of the day, though, I am the only one who can filter through the information and decide which pieces of knowledge enrich my research. With a program interdisciplinary in nature, I find being resourceful means opening up to diverse experiences, while being selective and critical in deciding which experiences are worth the time. We cannot do everything in life. Instead we weigh the costs and benefits to find the actions most suitable to our needs.

First PEHPL Summer School in Pictures (took place at NM-AIST on 16th - 21st January 2017)



Various events during the 2017 PEHPL Summer School



First PEHPL Summer School in Pictures (took place at NM-AIST on 16th - 21st January 2017)



Various events during the 2017 PEHPL Summer School



A word from the PEHPL members



Prof. Joram Buza, PEHPL Principal Investigator, The Nelson Mandela African Institution of Science and Technology - (NM-AIST)

It is an very important initiative whose main goal is to enhance livelihoods of small holder farmers through enhancement of the health and productivity of their livestock. In the process of achieving this, the PEHPL is developing PhD Scientists and Researchers on health and productivity of livestock and also enhancing the capability of the NM-AIST laboratory as well as staff. Furthermore, the PEHPL program is providing a unique platform for students from Africa to interact with students and Professors from Europe and America which is helping them build technical skills and expand networks. These attributes will ensure the sustainability of the PEHPL goals beyond the life span of the program. Gratitude to the Bill and Melinda Gates Foundation for facilitating the PEHPL program.



Prof. Guy Palmer, Mentor / Partner, Washington State University - (WSU)

“PEHPL has provided unique opportunities to develop the next generation of research leaders as an international cohort and, in doing so, bring diverse background, talents, and perspectives to livestock health and productivity. The questions addressed by the cohort through research in east Africa are important both for the region and for livestock systems globally.”



Prof. Lughano Kusiluka, PEHPL – Co - Principal Investigator, Vice Chancellor - (Mzumbe University)

The PEHPL is very unique in that it has provided opportunity for staff and students from universities in USA and UK work together with the counterparts in Tanzania, Kenya and Uganda to identify pressing problems in the livestock industry and finding scientific approaches for addressing them. More importantly, the program focus is smallholder farmers, who form the bulk of livestock keepers in the region, yet they are technologically less-equipped to address contemporary animal health and production challenges. With the generous support of the Bill and Melinda Gates Foundation, PEHPL has also provided opportunity for high quality training for young scientists in the region that will add to the critical mass of experts in animal health and livestock sciences, thereby enhancing the capacity of the region to provide quality services to smallholder farmers. The partnership between renowned scientists and researchers in the USA and UK universities and those in the East African Community (EAC) through co-supervision and mentoring of students is a perfect example of North-South partnership with positive impact on educational and research development in the South. The PEHPL stands to be one of the flagship programs in Africa that leverages on partnership between well-established universities in the North with universities and research institutions in the the South will the long term goal of enhancing scientific and technological development of universities in the South and engaging animal and livestock experts in solving in contemporary problems of the livestock sector, with special focus on smallholder farmers. The continued support of the Bill and Melinda Gates Foundation to this program will have tremendous impact on the livelihoods of smallholder livestock keepers in Eastern and Southern Africa.

Upcoming Events

- Visit by the BMGF Program Officer, Nick Juleff
- Tanzania Wildlife Research Institute (TAWIRI) Conference (6th - 8th, December 2017) at the Arusha International Conference Center (AICC)
- Tanzania Veterinary Association (TVA) 31st Conference (3rd - 5th December 2017)

For further information contact: Program for Enhancing the Health and Productivity of Livestock (PEHPL), Nelson Mandela African Institution of Science and Technology (NM-AIST), P.o Box 447, Arusha, Tanzania; Mobile: +255767012616