The treasure of field data: Establishing a livestock biorepository in Uganda – prospects and challenges

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Study goal

Biobanking is a key component of a successful disease prevention, surveillance and control programs in both humans and livestock. It is also critical for future scientific investigation. The quality and governance of biospecimen, however, remain key if a biobank is to achieve its purpose. In low-income countries like Uganda, biospecimen banking is done is a haphazardous manner without a systematic approach, including the collection of metadata related to biospecimen or a quality assurance protocol. The research for development project consortium Boosting Uganda's Investment in Livestock Development (BUILD), led by the International Livestock Research Institute (ILRI) in partnership with the Ugandan Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), are establishing a biorepository to ensure that the samples and data collected in the project can be useful for ongoing disease reporting, surveillance and even research after the project ends. The project has collected several thousand samples from livestock species (i.e. sheep, goats, cattle, poultry, and pigs) and humans and associated metadata. The biorepository will enable the safeguarding of these data for additional pathogen testing in the project and future use by the government.

Methods

To understand how biobanking is done at the MAAIF, we carried out an assessment at the National Animal Disease Diagnostics and Epidemiology Centre (NADDEC), the national reference laboratory for animal diseases, to establish the potential of setting up a project biorepository. The assessment included availability of space, hardware and software but also the capacity to process samples for long-term storage, curate associated metadata and gaps in infrastructure such as availability of electrical power and staff.

Results and Discussion

We found that over the past decades NADDEC collected and stored thousands of livestock biospecimen. However, metadata is often not available or is scattered on hard copies and in different places. Moreover, the quality of the biospecimen is doubtful because of constant electricity outages and voltage fluctuations that often destroy the biorepository hardware. Automated power back up has been set up over the years but erratically, not centrally for the entire laboratory. Different storage rooms operate on different back-up systems. This is partly due to lack of or delayed government funding; or ad hoc implementation when bilateral funding was provided. Also, there is no in-house capacity such as engineers to service and monitor the hardware and laboratory infrastructure. Laboratory technicians are not trained on recording and curating data to produce summary reports for government.

Conclusions

Upon this assessment, the BUILD project has developed a biorepository workflow at NADDEC to improve the quality of biospecimens collected in the field. Laboratory repairs have been conducted, two -80 ˚C freezers, one -20˚C freezer, and a fridge have been bought; power backup systems and voltage surge protection has been installed. Digitalised data collection using Open Data Kit (ODK) is being implemented and the metadata and biospecimen tracking is being done using OpenSpecimen software to link different repositories in the future. The laboratory technologists at NADDEC have received on-the-job training in several standard operation procedures in a biorepository as the project started sample collection, and material transfer agreements have been developed to ensure proper biospecimen governance with research partners in the consortium.

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