

Francis Kazoba, a farmer from Rwagitima village in Gatisibo district, bought eight cows as an investment and source of milk for his family, but as time went by, he realized there was a problem with his cattle.

The cows repeatedly suffered from unknown diseases, and he was not getting milk from the cows, which his family relied on for nutrition and income.

“I was confused because the cows repeatedly suffered from stillbirths,” Kazoba says, not knowing that it was Rift Valley Fever (RVF).

Thanks to a mobile phone-based system, Kazoba was able to report the detected symptoms on a timely basis and got rapid help to save his cows and his family from economic ruin.



The introduction of rapid reporting systems, using mobile phones to provide real-time data and the detection of high-infection areas, has Rwandese health workers and veterinary services excited about containing the spread of RVF, a viral hemorrhagic fever.

Rwanda, a country with extensive cattle keeping, reported a RVF outbreak in Eastern Province in 2018. When it was first detected, Rwanda veterinary services confirmed that at least 100 cows from different districts across the province died from RVF.

As RVF cases continue to be detected, livestock farmers are encouraged to use the new mobile system as a platform to report suspected cases in order to contain the outbreak.

The disease is spread to livestock through the bite of infected mosquitoes. The disease symptoms include fever, failure to eat, weakness, diarrhea, and increased chances of concurrent infections.

To help contain the spread, a new mobile-based solution was introduced in the rural areas for reporting disease symptoms through the phone system for fast health and veterinary interventions, thanks to the extensive mobile phone penetration in Rwanda currently hovering around 80 percent connectivity.

In 2016, the Rwandan government developed a strategy for Information and Communication Technology for Rwandan Agriculture (ICT4RAG). The strategy was developed with an aim to implement ICT in agriculture to achieve an “information-rich and knowledge-based economy”. For instance, in 2021, the government adopted the iCow Mobile phone App to help in combating RVF.

Additionally, there is the Smart *Nkunganire*(I tell you) System (SNS) is a supply chain system where farmers receive various information about their livestock, Elias Nzabagereza, a veterinary doctor in Gatsibo district said .



This is how it works. Questions written in Kinyarwanda developed by the Rwanda Agriculture and Animal Resources Development Board (RAB) are uploaded using the KoboToolbox server which directs them to the iCow App. The livestock farmers' responses are directly entered by the Community Animal Health Workers (CAHWs) and information disseminated on a two way- communication basis.

“Predictions and early detection for RVF and their spread are dependent on obtaining disease data history through the iCow App which is normally reported by the farmer who transmits initial report to CAHWs, who have been trained to understand transmission parameters such as infectious periods,” Nzabagereza said.

The training of these CAHWs, who are called upon on a volunteer basis, are supervised under the district veterinary doctors through the initiative of RAB and takes one week. They are introduced to feeding data on the demographics, livestock ownership, risk perceptions about zoonotic diseases and livestock, RVF knowledge, preferred communication sources and information sharing , as well as

protective strategies.

The volunteers are given smartphones to facilitate their work and for personal use as long as they perform their duties. The iCow is designed such that farmers can access it through all types of mobile phones: entry level, middle level and high-end phones.

“The iCow, a mobile-phone application, is helping farmers send alerts about outbreaks of diseases, such as RVF and foot-and-mouth disease, in the country. For the cost of sending a short message service (SMS) to CAHWs is only 10 rwfs, which is far more cost effective compared to the transport journey the farmer would have to take to report the case to the veterinary doctor,” Ngabagereza added.

In Mutenderi, a remote village from Ngoma district in Eastern Rwanda, Jean Bosco Muhame uses his smart mobile phone to monitor new RVF cases.

His 5-inch smartphone with 3 GB RAM and 64GB ROM has supported the busy activities of this livestock owner, who is also a community-based animal health worker to report newly detected cases of RVF.

“The system has been supporting most of the local livestock farmers to perform timely diagnosis of infection and give prompt advice on case management,” Muhame said.

Using smartphone, farmers download the application available in the Google Play Store and sign in using the credentials assigned to them by local veterinary service providers. “After signing in, I usually fill the provided form with all symptoms observed from the cattle before submitting it online,” said Muhame, who complained about the challenges related to poor network faced by livestock farmers in the remote rural village.

“With my mobile phone, I can get updates from farmers who are out in the field instead of waiting hours, sometimes days, for them to make it back here to the veterinary clinic with their reports,” Ngabagereza says.

Mukandoli Alice, 52, a farmer with 16 cows and eight goats in Ngoma village, says she uses the App and WhatsApp to send photographs of livestock with disease symptoms to CAHWs. She does this because she believes that it is easier for the vets to diagnose a disease by examining pictures of the infected animal compared

to just reading messages that may be inaccurate.

“I receive information from the application and WhatsApp group with other members that also have smartphones. We are 60 people in the WhatsApp group. In the group there are several vets, local leaders and some local farmers. The WhatsApp group is used to give information on pests and diseases. I can either send the group a picture or just a question, and I will receive an answer less than one hour later,” the farmer explained.

“The mobile phone reduces the costs and time for receiving or demanding information due to its ability to connect with farmers and CAHWs regardless of the time and place.”

These phone-based surveillance systems, according to Nzabagerageza, captures higher numbers of detected cases compared to traditional veterinary office-based surveillance system.

Apart from using human healthcare and veterinary workers to collect and submit surveillance data in these remote rural areas, crowdsourcing data from local communities, including cattle herders, are also being used to detect outbreaks using mobile phone surveillance systems.

According to him, the most important fact is to educate people on how to use the system and avoid reporting bias and providing inaccurate data.

With most of the pastoralists' lack of access to timely veterinary care, and limitations in diagnostic laboratory capacity in remote rural areas, the new mobile App and veterinary volunteers systems are rekindling farmers' hopes of access to regular and timely veterinary interventions to save their prized animals from deadly diseases like RVF.

Amani Jean Marie, one of the veterinary officers from Ngoma, says, “We have been able to recruit 30 CAHWs, who are using the App with interview questions, focusing on specific RVF transmission knowledge, which CAHWs fill then forward to RAB for review and action.”

Reporting on vital livestock information

Thanks to the iCow application, several cases of RVF were detected in districts of Ngoma and Gatsibo in Eastern Rwanda. Muhame, as an end user and a community

vet volunteer, has been able to report hundreds of abortion cases among cattle in the region to the national veterinary laboratory, triggering a massive vaccination campaign.

In response to the outbreaks, Rwandan veterinary authorities were able to vaccinate 237,386 heads of cattle, including 22,727 goats, and 17,872 sheep against RVF.

In 2020 Rwanda confirmed outbreaks of RVF in its key cattle producing provinces, including 689 cases detected in ruminant livestock. A total of 354,380 animals were vaccinated for RVF following the outbreak in the region.

Data from records submitted via mobile phone after analysis showed that the animals were suffering from RVF which is known to reduce fertility and cause stillbirth. The data provided by farmers, including Kazoba and Muhame really helped us, the veterinary officers based in the affected districts acknowledged.

The disease can also infect people through contact with blood, body fluids, or tissues of infected animals, or through bites from infected mosquitoes. In humans, the disease ranges from a mild flu-like illness to severe haemorrhagic fever that can be deadly, the World Health Organization (WHO) notes.

Currently, the integrated surveillance activities for zoonoses involve the systematic collection, analysis, and evaluation of health-related data from animal and human populations. These data, in turn, are used to enhance disease preparedness, improve resource allocation, and guide disease intervention strategies.



Aphonse Kirizi, working at the Agricultural Information and Communication Program (AICP) under MINAGRI, which runs the national extension service, said that use of mobile phones is cost-effective to the ministry.

“The technocrats don’t have to make those trips to access information about the livestock since we have CAHWs and Sector and district veterinary doctors near them and most importantly the effective use of mobile phones among all parties,” he said.

“The implementation of mobile phones in combating RVF under the extension and advisory service (EAS) unit is seen as a solution for creating a more efficient service where the ministry has been able to provide timely information about animal health and care tips while also cutting unnecessary transport facilitation costs from the ministry’s’ budget.”

Limited network coverage and intermittent electricity supply

Although mobile technologies are considered as a promising solution for transmitting timely information on common zoonotic diseases, there is need for mainstreaming the capacity of end users at different levels.

From veterinarians' perspective, in most cases farmers are not responsive in providing answers in real time because of the problem associated with both network coverage and electricity.

When the phones are out of reach or switched off, it is challenging for the veterinary service provider to get the right directions to the farmer's home sometimes leading to cancellation of the visit, they intimated.