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Washington State University Veterinary Medicine
Advancing animal health and welfare through research

Harnessing hi-tech solutions to meet One Health challenges

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Washington State University (WSU) is driving the future of disease diagnosis and management through innovative technology advances to meet One Health challenges globally. From digital applications to control rabies to using artificial intelligence (AI) to enhance diagnostics, WSU is at the forefront of these innovations and is leading veterinary medicine into the future.

Novel Storage of Thermotolerant Vaccines and Facial Recognition Technologies to Prevent Rabies

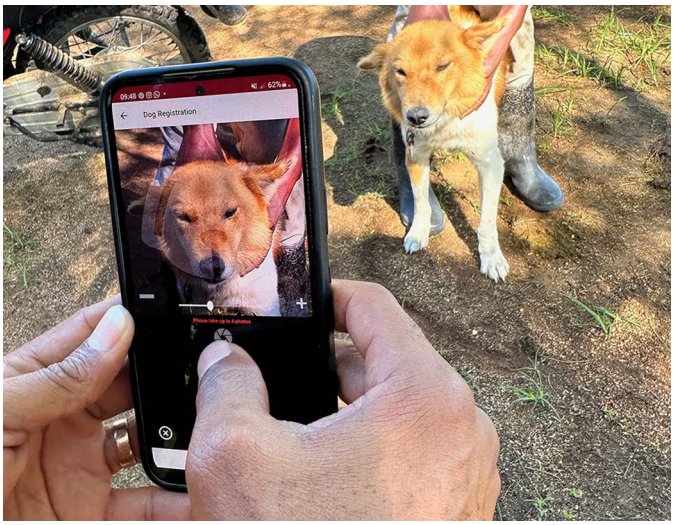
Worldwide, rabies kills 60,000 people annually. WSU is working to end human rabies by 2030 through mass dog vaccination (MDV) programs by inoculating the reservoir responsible for more than 99% of human infections. Implementing MDV is challenging, and in Tanzania, we are tackling 2 barriers to widespread delivery.

First, to address storage in places where power is limited, we tested Nobivac Rabies vaccine and found it thermotolerant, with potency following storage at 25 °C for 6 months or 30 °C for 3 months equivalent to cold-chain storage. To facilitate remote storage, we implemented a competition in Tanzania to design a device for long-term off-grid vaccine storage. The winning design, the Zeepot, is a clay pot-in-pot system. When ambient temperatures exceeded 40 °C, the internal temperature was < 25 °C, indicating that storage for 6 months without a reduction in potency is possible.

The second barrier is identifying vaccinated dogs, important for understanding when coverage is reached. Existing technologies are unreliable (removable collars), not sufficiently specific (owner identification, certification), or too expensive (microchips). WSU developed the first dog facial recognition technology. Installed on smartphones, it allows registration and, using facial recognition, identification of vaccinated dogs. The technology has positive and negative predictive values of 98.4% and 82.8%, respectively. Improvements in algorithm and smartphone camera technology will improve specificity and allow offline usage. The technology could also prove useful for other animal diseases and in population management.

Advancing Veterinary Diagnostics with AI

WSU is spearheading the transformation of diagnostic veterinary pathology. Traditionally, pathologists examine tissues manually using a microscope. Efforts within WSU have led to the integration and use of digital pathology to evaluate diagnostic cases. This method employs high-resolution scans of tissue slides that are analyzed on computer screens, improving the speed and efficiency of generating diagnostic pathology reports, which is crucial for timely decisions for patient care.



A vaccinator takes a photo of a dog's face using the facial recognition application.

This transition has also opened the door for integrating AI to automate and enhance veterinary diagnostics. WSU's Drs. Broughton-Neiswanger and Holder, in collaboration with Dr. Schneider of the USDA Agricultural Research Service, are developing algorithms to automate the reading of chronic wasting disease surveillance slides. This process, traditionally labor intensive and repetitive, is being streamlined to allow pathologists to dedicate more time to complex cases. Among other collaborative AI endeavors at WSU, Dr. Driskell and his graduate student, Jasson Makkar, are pioneering the use of deep learning for the quantification of digital images of hair fibers in efforts to revolutionize health monitoring and disease diagnosis in veterinary species.

These advancements at WSU predict a future where AI plays a central role in veterinary anatomic pathology, enhancing diagnostic precision and outcomes for all stakeholders in the veterinary field.