Courtesy of Felix Lankester, Washington State University

A Maasai tribesman herds cattle with wildebeests in the background in Africa.

WSU center seeks to improve animal health worldwide

Researchers in U.S., Africa study livestock diseases and how they are spread. As a result, they help people, too

By MATTHEW WEAVER
Capital Press

PULLMAN, Wash. — Graduate student Tim Casselli perches in a laboratory chair, wearing sky-blue protective gloves. Beneath a special exhaust hood, he carefully injects a bacteria-laced liquid into several test tubes.

He's part of a research project studying how fleas spread disease from infected wild animals to livestock. If he and other scientists can solve that puzzle, they can interrupt the process and prevent the disease's spread.

The stakes are huge; the discovery will help protect the health of livestock and the millions of African herdsmen who depend on them for their livelihood. In Central and Southern Africa alone, more than 135 million cattle and 201 million sheep and goats worth billions of dollars are raised each year, according to the United Nations.

This is one impact researchers at Washington State University's Paul G. Allen Center for Global Animal Health and their colleagues in Africa are having on animal health around the world.

"You may make a discovery here, but it applies as a solution globally," said Guy Palmer, director of the 62,000-square-foot Allen Center, which opened its doors in 2012 and is named after the co-founder of Microsoft.

Photos by Matthew Weaver/Capital Press

Washington State University professor Thomas Besser holds up a sample of water from a cattle trough May 11 in a laboratory on the WSU campus in Pullman. Besser is looking at the water found in troughs to see if there's a way to reduce exposure of cattle to E. coli bacteria. The single-celled organisms found in the "gunk" at the bottom of the bottle eat the E. coli, Besser said. Besser's work is part of the research done at WSU's Paul G. Allen Center for Global Animal Health.

Looking for answers

When avian influenza appeared in several Washington state backyard flocks earlier this year, scientists at the Allen Center worked with the Washington Animal Disease Diagnostic Laboratory on the WSU Pullman campus to analyze the disease and help animal health officials stop its spread. Wild migrating birds brought the disease from as far away as Asia, transmitting it to domestic flocks in British Columbia and Washington state first, and more recently to huge commercial poultry flocks in Minnesota, Iowa and other parts of the Midwest. The USDA estimates 39 million chickens and turkeys have been lost so far in 15 states at a cost of hundreds of millions of dollars in meat and egg production.

The Allen Center and the diagnostic laboratory are part of a national animal health laboratory network, said Terry McElwain, associate director of the Allen School for Global Animal Health and executive director of the diagnostic laboratory.

In Washington, the diagnostic lab took a lead role in testing samples from avian flu outbreak areas and suspect sites around the state. They were able to quickly identify infected premises, which was key to bringing the virus under control, he said.

"It's a little bit like funding your local fire department — you may not see them and you may not need them, but when the time comes, they're very, very important," McElwain said.

But the same investment hasn't been made by many Third World countries suffering from extreme poverty, McElwain said. He's working now to develop disease surveillance and laboratory networks overseas to prevent possible introduction of other diseases into the U.S. and elsewhere.

"Infectious diseases don't recognize borders," Palmer said. "We need to know what's going on in other countries. You don't want to start developing your response strategy once you've got sick animals. That's where global and local become the same thing. We want to know what are the diseases out there before they're here."

Preventing other diseases

In East Africa, clinical assistant professor Felix Lankester is working on a way to prevent malignant cataharral fever — known by the initials MCF — from spreading to cattle that come into contact with infected sheep and wildebeests. Wildebeests are ungulates native to parts of Africa.

Once an effective vaccine has been developed against the wildebeest-associated MCF scientists will use it to develop vaccines against other types, which affect cattle, bison and deer in Europe, Asia and the U.S., said Lankester.

"In Africa, people's lives are intimately related with the health of their livestock," Lankester said. "Consequently, any livestock health improvements will have a beneficial economic impact on marginalized and impoverished livestock keepers, helping to lift millions of people out of poverty."

E. coli and cattle

Two areas of concern for scientists at the Allen Center are E. coli and salmonella, pathogens that cause serious food-borne outbreaks of illness in people around the world. In the U.S. alone, the Centers for Disease Control reckon that 48 million people a year are sickened by food-borne pathogens, 128,000 of them require hospitalization and 3,000 die.

Microbiology professor Thomas Besser has been looking for a way to rid cattle of the bacteria E. coli O157:H7, which is to blame for some food-borne illnesses and deaths associated with ground beef and other foods.

A professor in WSU's College of Veterinary Medicine, he is also an adjunct professor at the Allen Center.

Cattle aren't affected by E. coli but they can carry the pathogen, often all the way to the slaughter plant, where they create a risk of contamination. That risk has decreased over time, due to investments in better sanitation made by meat processing plants, Besser said, but the possibility still lingers.

But Besser no longer believes cattle are a primary reservoir for the bacteria. Evidence suggests the culprit might be something as simple as a water trough. Most E. coli infections in cattle occur in the late summer, and occur less frequently in other times of the year. Besser believes water troughs may be where E. coli persists. During the summer, E. coli thrives in them. During the winter, more single-celled organisms in the water troughs eat the E. coli bacteria. Such organisms could ultimately be used to control E. coli, Besser said.

Controlling salmonella

Another disease researchers are studying is salmonella, which is also associated with food-borne illnesses.

WSU assistant professor Margaret Davis has compared the genetic "fingerprints" of salmonella from humans and from cows. The most common conception of salmonella is as a food-borne disease, but those with the bovine-type infection likely got it from contact with cattle, she said.

Most U.S. ranchers take proper precautions to avoid getting salmonella from cattle, Davis said. But it's important they know bacteria like salmonella and E. coli are in the animals' feces, she said. She recommends gloves and protective wear to avoid fecal contamination.

While such practices are common in the United States, they aren't followed by herdsmen in many other parts of the world. For example, in some cultures the people even construct their houses using dung as a building material, Davis said.

Davis said the center will train veterinarians and others to reduce exposure to salmonella and E. coli in their home countries.

"The protections against these pathogens are things like washing your hands, cooking your food thoroughly and maintaining some separation between your livestock's feces and yourself," she said. "These really basic things we take for granted."

By the numbers

Paul G. Allen Center

$35 million Cost of the Paul G. Allen building

$26 million Paul Allen's grant to WSU in 2010

$25 million Matching grant made by Bill and Melinda Gates Foundation to WSU

$10 million Total annual budget

62,000 Square footage of building

50 Postgraduate Pullman-based students of which approximately half are international

21 Countries represented by international students

40 Number of faculty

350 Donors to the center

Sources: WSU; Capital Press research
Matthew Weaver and Alan Kenaga/ Capital Press

Washington State University associate professor Margaret Davis gives a tour of her laboratory space May 11 in the Paul G. Allen Center for Global Animal Health on the WSU campus. Davis' work includes determining how pathogens are transmitted among animals, and from animals to humans.

Online
http://globalhealth.wsu.edu/