



One Health

An old concept meets a 21st century need.

by **Barbara Hesselgrave**

In today's world, the convergence between animals, humans and their respective environments has become more interdependent than we often realize. We are literally no more than 24 hours from any two points on the globe. And, as communities around the world cope with rapid changes in climate and land use, the borderlines between people and their goods and products — and the hidden domain of diseases — has gradually begun to blur.

A group of forward-thinking leaders, including scientists, policymakers, physicians, veterinarians and public health officials, says the time has come to recognize this interconnectedness in how we address the health challenges of our ever-shrinking world. They don't separate the concepts of human health, animal health and environmental health. They envision instead a concept called "One Health" that incorporates the common goals of global human health, animal health, food safety and environmental stewardship.

Although today's movement sounds very 21st century, the roots of One Health reach back more than 100 years to 19th-century Canadian physician William Osler and Rudolf Virchow, a German physician who pioneered animal test experimentation. Both recognized the effects of animal illness as it affected public health, with Osler coining the term "One Medicine" to describe that relationship. But it was many decades later before the concept was revived by Veterinarian Epidemiologist Calvin Schwabe, who brought One Medicine back to attention in his 1984 text *Veterinary Medicine and Human Health*.

Nonetheless, as Larry Madoff recalls,

the linkage "between human and animal health was not presented" in his medical school curriculum. Madoff, who moderates ProMed, an Internet-based disease early-warning resource for the International Society of Infectious Disease (ISID), says, "We learned very little about animal health and where it intersects with human health."

He notes, however, these principles really fit today's "green" mindset of a planet shared by all, and he says he is encouraged by the current progressive thinking of the One Health movement.

Teamwork tackles an outbreak

Peter Cowan, veterinarian and professor at the North Carolina State University (NCSU) College of Veterinary Medicine, says, "Using the One Health concept [is one of the best ways] we can prevent disease on a global basis, which really means, prevent it from coming here."

Cowan participates in the U.S. Centers for Disease Control and Prevention (CDC) Epidemic Intelligence Service (EIS) program in Nigeria. In that African nation of nearly 150 million, the agricultural sector is by far the largest employer, but the country struggles with inadequate infrastructure. Cowan is involved with assisting to build capacity in the Nigerian veterinary infrastructure to improve public health.



"The veterinary services and contributions to public health have become interdependent — in the sense that when a disease pops up, we have to be able to depend on an individual country to do their best to eradicate the disease," he said.

He describes how the EIS used the One Health concept to combat a recent avian influenza outbreak in Nigeria.

"For the first time there were an equal number of physicians, laboratorians and veterinarians working together," he says, which proved an effective strategy to mitigate the spread of avian influenza in that country.

Cowan says the multi-specialty collaboration, along with the Nigerian government and public health officials,

ProMED-mail launched

In 1994 ProMED-mail was formed as an initiative of the Federation of American Scientists (FAS) with technical support from SatelliLife of Boston, Mass. Its mission is to provide early warning — seven days a week year-round — of outbreaks of emerging infectious diseases and episodes of acute toxicity, as well as of the spread of antibiotic and disease vector resistance. The service is provided worldwide, free of charge by e-mail. It is moderated by infectious disease specialists to maintain a high level of scientific credibility.

mounted a very effective defense against the disease, implementing a poultry depopulation program and thwarting an epidemic that could have had devastating consequences for the rest of west Africa.

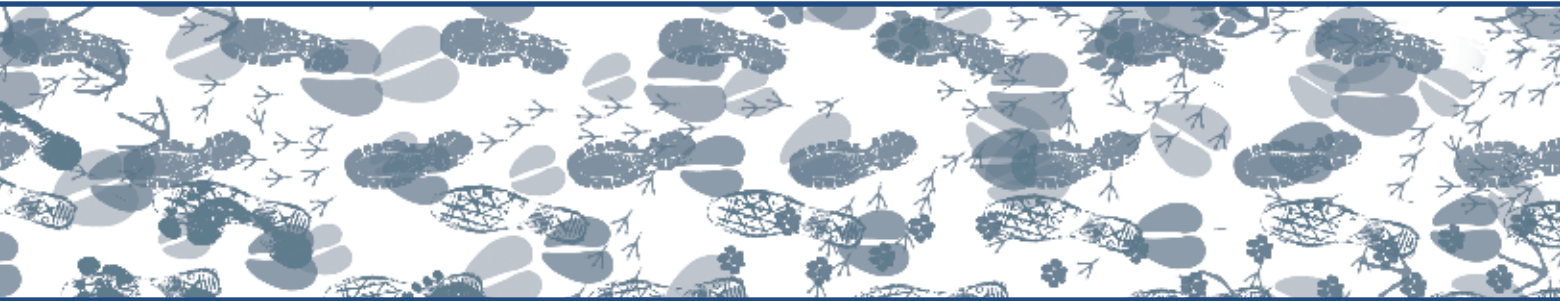
"They haven't had a new case for two years," he says. "They're developing programs of other zoonotic diseases of livestock, and this has allowed them to develop a strong infrastructure, and we're all the better for that."

While not every government has the means to respond with the same efficiency, a strong veterinary and public health infrastructure is key to swift response to tackling an emerging outbreak of disease. Cowan says the veterinary contributions to public health are well-established and have made history in eradicating and controlling livestock diseases such as brucellosis, pseudorabies and hog cholera, as well as diseases affecting pet animals and wildlife.

Not only has basic knowledge of certain diseases been derived from veterinary studies, Cowan says, but the profession has also contributed some of the basic principles of disease control.

Keeping tabs on the horizon

Looking back to the effect of the foot-and-mouth disease (FMD) pandemic of 2000 and 2001 in the United Kingdom (UK), Larry Madoff says the epidemic "was very disruptive on beef prices, farmers and the whole country — travel, tourism, the economy. It was not a minor event." Estimates of the economic effect of the 2001 disease outbreak have been reported as high as \$16 billion.



Madoff says a similar incident involving the livestock or poultry industry, or swine or cattle in the United States, “would have a huge impact on our country.”

“It never came here because we were so well-prepared and alerted,” Madoff says. “The one thing we’ve learned is to expect the unexpected,” since “it can get here quicker than we think.”

Madoff says keeping abreast of developments in disease should be a concern for any animal producers, while credible resources like the International Society for Infectious Diseases’ website can help producers “to just keep tabs on other places.”

A life-changing concept

Cowan says the One Health concept goes beyond just fighting disease, serving as the foundation for innovation to change our lives.

“All of the in vitro fertilization techniques actually came out of the artificial insemination (AI) procedures to control bovine fibriosis,” Cowan says.

Vibrio was a common disease sexually transmitted by breeding bulls, he explains. “It led to a lot of infertility in herds, and one of the big advantages of AI was to get around all that,” he adds.

“All that expertise led to embryo transfer (ET), and those were well worked out in the veterinary world.” A decade later, during the

1980s, he says, “those concepts were adapted to human in vitro fertilization.”

That example, he says, illustrates just one fundamental medical technique that can be broadly applied, not just to a species-specific use.

“That is the heart of One Medicine, and here at the college we’re certainly interested in fundamental research in a comparative fashion to impact human medicine and human well-being,” Cowan says.

Going forward: A defining moment in global health

In 2007 the concepts of One Health gained further ground and became a focus for the American Veterinary Medical Association (AVMA). The AVMA began a task force to examine a One Health initiative to identify needs and create a statement of principles and action that would bring together veterinarians, physicians, public health officials and environmentalists toward a mission of collaboration.

The AVMA described multiple issues as the basis of One Health need:


- ▶ projections for increased animal protein rising by as much as 50% by 2020;
- ▶ the majority of newly emerging infectious diseases in the last 30 years having been of zoonotic origin;
- ▶ foodborne, waterborne diseases

threatening human and animal health; and

- ▶ 60% of the nearly 1,500 diseases recognized in humans having multi-host pathogens that move across species.

Other factors include changes in climate and in land use that affect the spread and emergence of pathogens globally.

The AVMA released their findings and recommendations in the 2008 paper *Executive Summary of the AVMA One Health Initiative Task Force (OHITF)*, which the association says, “provides groundbreaking recommendations and strategic actions to support and expand the One Health concept across both veterinary and human health professions.”

One Health continues to move steadily into the mainstream. Recently organized advocacy groups such as the One Health Initiative (www.onehealthinitiative.com) and the One Health Commission (www.onehealthcommission.org) have the input, support and collaboration of relevant stakeholders from government, academia, medical and veterinary professionals, and the private sector to advance their goals and vision. 

Editor’s Note: *Barbara Hesselgrave is a writer based in Luray, Va., specializing in health sciences and public policy. We welcome her first submission to the Angus Journal.*