Critical Needs for Research in Veterinary Science

Research in veterinary science is critical for the health and well-being of animals, including humans. Food safety, emerging infectious diseases, the development of new therapies, and the possibility of bioterrorism are examples of issues addressed by veterinary science that have an impact on both human and animal health. However, there is a lack of scientists engaged in veterinary research. Too few veterinarians pursue research careers, and there is a shortage of facilities and funding for conducting research. There is an urgent need to provide adequate resources for investigators, training programs, and facilities involved in veterinary research to seize the opportunities to improve and safeguard human and animal health.

Few people recognize the broad range of veterinary research and its many important contributions to society in the realms of public health and food safety, animal health and welfare, and comparative medicine. Opportunities in veterinary research include comparative studies with animals that shed light on human health problems; the development of tools to better detect, prevent, and control zoonotic diseases (that spread from animals to humans); the establishment of scientifically-based policies for the humane treatment of animals; and the development of measures to secure and protect the nation’s food supply and farm-animal economy from a potential act of bioterrorism (see Box 1, p. 2).

This report, prepared by the National Research Council of The National Academies, identifies questions and issues that veterinary research can help to address, and discusses the scientific expertise and infrastructure needed to meet the most critical research needs.

Reaching Across Disciplines and Institutions

The three major disciplines within veterinary research discussed in this report—public health, comparative medicine, and animal health—are closely intertwined. For example, research in comparative medicine contributes to animal health through the development of preventive medicine and treatment. The study of wildlife diseases contributes not only to wildlife health and conservation, but also to public health because many animal diseases can spread to humans. Therefore, collaborative and interdisciplinary research is crucial in translating scientific advances from one traditional discipline to another.

However, interdisciplinary research is in many cases hampered by administrative, funding, and cultural barriers between institutions. Furthermore, agencies that support veterinary research have specific missions. Funding to support proposed interdisciplinary research can
be difficult to obtain when it is partially related to the
mission of several agencies but does not perfectly fit the
mission of any one agency.

The report urges the veterinary research
community to encourage research funders to develop
a long-term interagency strategy for veterinary
research. That strategy might include:

- The creation of a specific focus at the National
  Institutes of Health (NIH) on integrated
  veterinary research via the Roadmap initiative.
  Joint interagency collaborative programs could
  also be established to enhance interdisciplinary
  collaborative research.
- NIH could create a veterinary liaison like
  the veterinary-medicine and public-health
  liaison at the Centers for Disease Control and
  Prevention (CDC) to help to ensure integration
  of veterinary and human medical research.

**BUILDING CAPACITY**

**Developing Student Interest in Veterinary
Research**

The majority of students who obtain a
Doctor of Veterinary Medicine (DVM) do not go
on to pursue the PhD and postdoctoral training
needed to become a researcher. An earlier
National Research Council report, *Veterinarians
in Biomedical Research*, projected a deficit of
336 veterinary pathologists in the United States
and Canada in 2007, and the American College
of Veterinary Pathologists reported needs for
149 veterinary pathologists in 2004. Similar
human resource needs have been reported by
the American College of Laboratory Animal
Medicine, U.S. Department of Agriculture, and
Centers for Disease Control and Prevention
(CDC). The shortage is due partially to declining

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**Some Opportunities in Veterinary Research to Improve Human and Animal Health**

**Animal Health and Welfare**
- Prevention and control of infectious, toxicologic and parasitic diseases of food
  producing animals in ways that maintain herd health and economic viability of
  industries that supply meat, milk, eggs and other animal products.
- Improvement of the longevity and quality of life of companion animals, which in turn
  will have favorable effects on their caregivers.
- Determination of optimal care for laboratory animals and prevention, detection, and
  management of their diseases.
- Prevention of population declines in wildlife species that are of interest for ecological
  balance, recreation, tourism, or conservation.

**Public Health and Food Safety**
- Prevention of the recurrence and reduction of the effects of foodborne illnesses
  associated with livestock and poultry
- Protection of food-animals from intentional introduction of biological agents or related
  products that can cause disease or death in humans and animals.

**Comparative Medicine**
- Improvements in human and animal health research through comparative studies in
  many disciplines, including hematology, immunology, vaccinology, virology, genetics,
  transplantation and gene therapy.
- Reduction of the risk of transmission of zoonotic and other emerging agents between
  wildlife, domestic animals, livestock and humans.
interests in research among veterinary students, many of whom have little exposure to basic science and hands-on research.

Other factors also play a role in discouraging students, such as the substantial cost and time commitment to obtain research training and a lack of available financial support. To meet the nation’s needs for research expertise in veterinary science, changes in recruitment and programming for graduate and veterinary students will be required. Changes recommended in the report include enhancing research cultures in veterinary colleges and strengthening summer research programs, combined DVM/PhD degree paths, and the integration of basic science into clinical curricula. The American Veterinarian Medical Association (AVMA), Council on Education, which is charged to review colleges of veterinary medicine for accreditation and publishes guidelines for the process, should strengthen the assessment of research in regard to opportunities for research experiences for veterinary students.

Facilities and Infrastructure

Addressing critical issues in veterinary science requires not only adequate human capacity, but also the appropriate infrastructure, and financial resources. The last major federal program to support construction of facilities for colleges of veterinary medicine (CVMs) ended nearly 40 years ago. The Association of American Veterinary Medical Colleges (AAVMC) has documented that more than 1.5 million sq. ft. of new and half a million sq. ft. of renovated facilities are needed to train additional veterinary and graduate students to meet the demands of public practice. Space for classrooms, teaching, and research laboratories at all biosafety levels and housing for research animals is needed. Existing funding sources, such as state and university funds and gifts from foundations and private donors, are unlikely to meet the needs of the nation.

The report recommends that AAVMC and its members identify ways in which the CVMs’ facility needs can be met financially and logistically, including outreach efforts to educate policy-makers in federal and state governments about the necessity of additional facilities to train adequate veterinary researchers. Biocontainment laboratories, which are required for research on high-risk pathogens, should receive special attention. Adequacies and shortfalls in facilities needed to support veterinary research—both federal and nonfederal—should be documented and quantified.

Other research resources for veterinary research include libraries, databases, animal health monitoring and surveillance systems, electronic communication systems for sharing data and clinical information, specialized populations of animals, and collections of research materials, such as tissue samples. The report recommends that the American Animal Hospital Association, AAVMC, and AVMA address the need for more effective communication among the federal, university, and private sector entities involved in veterinary research to make the most of scarce resources. The need for collectively developed databases, animal health monitoring and surveillance systems, specimen collections, and other sharable research tools to support veterinary research should receive special attention.

Many disciplines in veterinary research have benefited substantially from access to well-characterized animal colonies with known diseases. These colonies are important for examining normal and abnormal biological pathways and mechanisms. The report recommends that NIH and USDA ensure that model colonies of animals and related tools, such as cryopreserved germplasm, be available to researchers.

Financial Support for Veterinary Research

A review of the organizations that are most likely to fund veterinary research reveals that some research disciplines do not have an identifiable source of financial support from government agencies. Those disciplines include
ecological research on zoonotic emerging diseases, dynamics of select agents, biodefense pathogens in wildlife, companion-animal and equine research, wildlife and conservation research, and zoo animal and exotic-pet research—all of which contribute to animal health and welfare and to important elements of human health research, but they do not have dependable, permanent financial resources that would ensure their continuing advancement in research.

The report recommends that the veterinary research community should actively engage NIH, USDA, the Department of the Interior, the National Science Foundation, and other federal agencies and urge them to recognize and address the need for financial support for the disciplines of veterinary research that lack identifiable sources of federal funding despite their contributions to public health, comparative medicine, and animal health and welfare.

Conclusion

This report identifies many opportunities for veterinary research to improve animal and human health and welfare. Because of its small workforce and limited infrastructure and financial resources, the veterinary research community can devote little time and effort to developing and improving predictive and diagnostic tools for preventing the emergence and outbreak of disease. Early diagnosis or prevention can lessen the social and economic impact of diseases.

The success, and indeed power, of any society rests in its ability to predict, prepare for, and prevent adverse events while taking advantage of opportunities. Today’s veterinary research enterprise has little capacity to fulfill those important societal mandates. Expanding the veterinary workforce and providing trained personnel with research resources can lead to enduring advances in animal and human health.