

Veterinary Medicine: Physicians for the Universe

A Prospectus on Identifying Future Trends and Business Opportunities

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Background

It has been said that veterinarians are universal biologists or universal physicians. No other profession better understands health and disease among so many species. They are also called upon to understand the environmental interface between human health, wildlife health, livestock health and companion animal health. Thus, it is critical that the veterinary profession carefully plans for the world's future needs. Although several studies (Table 1) have been commissioned over the past two decades to evaluate future directions for veterinary medicine, the profession and veterinary medical education institutions continue to respond to internal signals and internal needs rather than consider meeting the needs of a changing, and global, society. This prospectus is a draft document on the challenges facing the veterinary profession and veterinary medical education, and how future societal needs might be met by a profession poised to deliver significant benefits to our world. Such delivery will require planning, partners and action.

Table 1 - Examples of prior studies

Future Directions for Veterinary Medicine (PEW National Veterinary Medical Education Program, Institute for Policy Sciences and Public Affairs, Duke University, 1988)

An Idealized Design of a North American Companion-Animal Healthcare System (published on behalf of the Companion Animal and Family Health Council, 1996)

The current and future market for veterinarians and veterinary medical services in the United States (KPMG LLP, Washington, DC, 1999)

An Agenda for Action: Veterinary Medicine's Crucial Role in Public Health and Biodefense and the Obligation of Academic Veterinary Medicine to Respond [JVME 30(2), 2003]

Envisioning the Future of Veterinary Medical Education: The Association of American Veterinary Medical Colleges Foresight Project [JVME 34(1), 2007]

Roadmap for Veterinary Medical Education in the 21st Century: Responsive, Collaborative, Flexible (North American Veterinary Medical Education Consortium, draft 20 October 2010)

In addition to the studies listed in Table 1, the National Research Council (NRC) convened an expert committee in 2007 to study the broad scope of issues related to the veterinary workforce in the United States. The NRC committee was to explore the historical changes in the size and characteristics of the veterinary workforce, the adequacy of the current supply of veterinarians in different occupational categories and employment sectors, and the factors that are likely to affect the numbers of veterinarians seeking jobs in different sectors in the future. The diversity of current (and future) employment sectors makes such an evaluation challenging. Examples of current sectors include small animal (dogs, cats) and large animal (food animals, horses) practitioners; laboratory animal veterinarians; pathologists; wildlife and zoo veterinarians; veterinarians specializing in exotic medicine; veterinarians working for federal agencies [e.g., U.S. Fish and Wildlife Service (USFWS), Food and Drug Administration (FDA), U.S. Department of Agriculture (USDA), National Institutes of Health (NIH), Department of Defense (DoD), Department of Homeland Security (DHS), U.S. Agency for International Development (USAID), congressional offices/committees]; veterinarians working for international agencies [e.g., World Health Organization (WHO), World Organization for Animal Health (OIE), Food and Agriculture Organization (FAO)]; industry veterinarians (e.g., pharmaceutical, insurance, and food companies) and many other sectors. Political issues may have also delayed the report, since practicing veterinarians experiencing reduced client visits during the recent recession may seriously doubt the need to educate more veterinarians. Additionally, academic veterinarians are often reluctant to consider new models for educating students. Anxiously awaited, the NCR report has not been published as of the writing of this document. The profession does not seem capable of promptly gathering and analyzing significant trends, surveying customers and other stakeholders, and responding rapidly enough to the changing needs of society and global market challenges/opportunities.

This document will briefly discuss the challenges and opportunities for the veterinary profession: strategic science, education, and societal needs/expectations and business opportunities across major species categories. It will also outline issues to be efficiently and effectively assessed and addressed for a profession that the universe depends upon. The document is written for those with a key interest in veterinary medicine and animals in general, but

perhaps lacking detailed knowledge about diverse aspects of the veterinary profession.

In addition to focusing on the veterinary profession in isolation, this document is meant to stimulate future dialogue on how a well-respected profession might be relevant to the many issues facing our world: food accessibility, vulnerability and security; building more humane communities for people and pets; addressing the planet's overall health; addressing endangered species; seeking environmental justice; how to address ongoing issues such as poverty and overpopulation.

It is also written with the hope that readers who are positioned to make a difference in advancing veterinary medicine will see opportunities for advancing a profession that is trusted and needed by so many.

Strategic Science – *Proactively planning science so that outcomes might be optimal*

The **Morrill Land-Grant Acts** (1862 and 1890) allowed for the creation of land-grant universities. One objective of these Acts was to include science for agricultural advancement. Veterinary colleges/schools were established at several Land Grant Universities and were effective in advancing the science of agricultural animal health. Twenty-four of the 28 U.S. veterinary colleges/schools are located at a land grant university³. Significant advancements in livestock health were achieved through research, and the training of successful food animal veterinarians, at these land grant universities. Veterinary education later extended its education and application to other animals and to biomedical (including non-livestock and human health) research. Today, most veterinary students are pursuing careers in companion animal (dog, cat) medicine and increasing numbers of rural communities are without a veterinarian that can treat livestock. According to the American Veterinary Medical Association, 77 percent of veterinarians who work in private medical practices now treat pets⁴.

Clinical training and research at veterinary colleges/schools are also heavily weighted toward companion animal medicine – addressing issues that are of prime importance to pet owners, the pet industry or federal agencies with an interest in translational research (i.e., research that can be applied to human health/disease). As less training and research is conducted on livestock, less of the operating budget comes from governmental funding. Operating budgets have become highly dependent on indirect cost recovery (ICR, overhead) from research granting agencies or other funding groups. As such, veterinary scientists are encouraged by administrators to seek grants with the highest

³ Auburn University, University of California (Davis), Colorado State University, University of Florida, University of Georgia, University of Illinois (Urbana-Champaign), Iowa State University, Purdue University, Iowa State University, Kansas State University, Louisiana State University, Michigan State University, University of Minnesota, Mississippi State University, University of Missouri, Cornell University, North Carolina State University, The Ohio State University, Oklahoma State University, Oregon State University, Texas A&M University, Tuskegee University, Washington State University and the University of Wisconsin (Madison).

⁴ Bureau of Labor Statistics, Occupational Handbook 2010-2011

overhead payments. Universities may even charge an internal overhead fee to their own departments conducting research. This “search for best ICR” contributes to the interest in grants from the NIH versus grants from non-profit agencies. Thus, science is frequently based on opportunities for immediate revenue generation rather than for significant breakthroughs. In addition, grants from NIH must be applicable to human health which limits the benefit for animals in general (some diseases that are unique to animals are minimally studied).

Academic science at U.S. colleges and schools of veterinary medicine has become “safe” rather than “strategic” due to the inherent incentive system. Grants obtained with the largest overhead are seen as a favorable indicator by committees and administrators for conferring promotion or tenure. As Jack Welch, former CEO of GE has stated, “Show me the incentive and I will show you the behavior”. Scientists desiring tenure and job security will “rise” to meet the goals of tenure committees rather than strategically plan for science that could significantly help the universe. Because grant dollars are in short supply, competition, rather than collaboration, across disciplines and institutions also leads to a reduced likelihood of major scientific discoveries.

Academic scientists themselves will often state that success in acquiring grant money is more about the “art” of grant writing than about significant innovation. The goal is to sustain graduate programs and research laboratories rather than consider innovative studies with more associated risks. When seeking grants, overworked scientists may opt to prepare an “easier” grant rather than develop a more complex grant seeking a major discovery or testing a novel idea. Complex grants require more time and planning, especially when multidisciplinary and multi-institutional partners are added to increase the chances for successful outcomes. Such planning time is often unavailable at today’s veterinary colleges, many of which are struggling for economic survival. During the recent recession, veterinary scientists were frequently put on furlough (unpaid leave), yet expected to be at work. At work many were diverted from research endeavors to clinic duty in an attempt to raise additional revenue. Many scientists requested no-cost extensions from granting agencies while they

diverted their efforts from research to clinical assignments. Some colleges even closed their facilities during the holidays to save on labor and utility costs⁵.

Even large federal agencies are not always able to advance innovation, with both intramural and extramural science directed toward “safety” or political acceptance rather than success. Leroy Hood, referred to as the Father of Systems Biology, was unable to convince NIH to fund his work on DNA sequencers and synthesizers⁶. The DNA sequencer later revolutionized genomics and was subsequently used by NIH to map the human genome. Hood left academic medicine in order to achieve his goals, later founding the Institute of Systems Biology in Seattle. Today, there are tremendous opportunities for governmental agencies to fund innovation that includes both animal and human health. While NIH funding has traditionally provided some grant money to veterinary scientists using animals for models to study human diseases, there is no NIH division that funds animal research for strategically advancing discovery in the animal research field for the direct benefit of the animals. Even when research is directed toward direct benefit to animals, research findings would undoubtedly provide clues for diseases in humans. NIH is planning to launch a new National Center for Translational Science (NCATS)⁷. It is unclear as to how animals might assist, and be beneficiaries, of this effort. Strategic science and multiple disciplinary partners could provide tremendous clues for improving both animal and human health.

Strategic science is required for evidence-based veterinary medicine. Animal owners want veterinarians to provide therapies that have the highest likelihood of success. Unfortunately, common diseases are often treated without scientifically-based evidence and controversy still remains over the frequency of veterinary visits needed each year to optimize wellness for dogs and cats. In some cases, veterinarians opt for screening tests and therapies that provide the highest revenue, rather than provide for the highest likelihood of preventing or curing disease.

⁵ University of Minnesota Year-end Winter Closure, December, 2010 - website

⁶ McElheny, VK. Drawing the Map of Life, Inside the Human Genome Project, Merloyd Lawrence Book, Basics Books, A Member of the Perseus Book Group, 2010

⁷ Collins, Francis S. Reengineering Translational Science: The Time is Right, Sci Trans Med, 6 July 2011

Strategic science also calls for research in how to prevent disease in the first place. The public wants to know how they might reduce the risk of poor health for themselves and for their animals. Over the past several decades, research for preventing disease in food animals has advanced; such advancement was necessary for economic viability. Research for preventing disease and death is also necessary for saving endangered species, addressing pet overpopulation and unwanted horse issues, and in providing owners with rational information on how to prolong the lives of their animals.

Companion Animal Research: Keeping companion animals healthy provides “social capital” to a community. Dogs provide companionship to both children and the elderly, they guide the blind, and they are associated with reduced stress and better human health. Cats are now considered America’s most popular pet. Due to their smaller size, cats are often allowed in rental properties and are also associated with giving their human owners many smiles and much happiness⁸. Horses are also referred to by many owners as important companions, although others consider the horse livestock (see below).

In order to advance companion animal health and welfare, one must first identify and prioritize those issues of highest significance or those with dramatically changing trends. Such information can greatly assist with planning strategic science, such as occurs in Sweden where approximately eighty percent of the country’s dogs have health insurance⁹. Because of such coverage, scientists can rapidly assess diseases with highest morbidity and mortality from reimbursement claims. Such information not only allows the company to adjust premium prices on the basis of risk, but also allows various breed clubs to address health issues of highest importance (strategic science). Approximately one-fifth of pets in the United Kingdom are covered by health insurance. In the U.S. and Canada, less than two percent of pets are covered. This trend appears to be changing, however, with more U.S. families opting for wellness and/or insurance plans.

While U.S. pet insurance companies could be positioned in the future to assess health and disease trends, governmental agencies should also have an interest

⁸ Morris Animal Foundation Survey: Helping Cats Find Homes, 2009

⁹ Agria Insurance, Information from B. Bonnett, epidemiologist who has consulted/worked with Agria for 15 years

in “real-time” surveillance of pet health – especially as pet health relates to human health. Pets live in close proximity to people, breathing the same air, drinking the same water, often eating the same food, and exposed to similar environmental toxins and carcinogens. Thus, we cannot adequately study the health of an entire family, unless we study the health of the animal family members.

The National Cancer Institute has a Comparative Oncology Program, which is directed by a veterinarian¹⁰. The program has done some excellent work, using a clinical trials model for assessing cancer therapies in dogs that might be modified for use in children. While this program has tremendous benefit for those currently suffering from cancer, it does not assess common risk factors whereby cancer might be prevented in the first place – for both people and pets. Animals living in their homes (natural environments) could offer tremendous clues for piecing the “cancer puzzle” together. The shorter life span of animals allows for quicker discovery by assessing genetic, dietary and environmental risk factors for cancer and other chronic diseases. Clues in the animal kingdom seem to abound (Table 2).

¹⁰ Dr. Chand Khanna

Table 2 – Clues from the animal kingdom

The Tasmanian devil is now endangered due to an infectious facial cancer. The disease, thought initially to be of viral origin, was recently reported to be derived from mutated Schwann cells (insulating cells in the nervous system) that became cancerous and passed to other devils. An international group of researchers reported on this breakthrough January 1 in Science News¹¹. How does a Schwann cell change and become “infectious”? Was some type of infectious agent, beyond the mutated Schwann cell, missed? Certainly, this must be an interesting question for both animal and human cancer research

Santa Catalina Island foxes are dying of ceruminous gland carcinoma (cancer) of the ear canal – also seemingly contagious. Could ear mites be transmitting this cancer as one group of researchers has proposed?

Owners of gray horses are told that their animals will sooner or later develop melanomas. However, unlike melanomas in humans, the tumors in gray horses are rarely fatal. Why are melanomas in horses benign? How might medical and veterinary researchers collaborate to uncover the answer to this important question?

One in four pet dogs over the age of two years will die of cancer. Golden Retrievers in the U.S. have the highest risk for cancer death (over 60 percent), yet these dogs appear to have very different types of cancer from Golden Retrievers born in Europe. Why do dogs in the same breed, but in different geographic locations, have different forms of cancer?

Virally-induced cancers and chronic disease in domestic and wild cats (e.g., feline leukemia, feline infectious peritonitis, and feline immunodeficiency virus) continue to offer significant clues for human disease discovery. Certain genetic lines of wild cats are at high risk to viral diseases while other lines are not, perhaps due to differences in their immune systems. Might medical and veterinary researchers, working more effectively together, solve the puzzle for prevention and cure?

¹¹ Tasmanian Devil Cancer Culprit Revealed, January 1, 2011, Science News, Tina Hesman Saey

How might philanthropic organizations and businesses partner provide incentives for such collaborative work? Dr. Anthony (Tony) A. Frank, President of Colorado State University and also a veterinarian, commented¹² that following a campus flood in 1997, it was necessary to house faculty from different departments together for several months while the flooded offices were repaired. During this time, filings for discoveries and inventions surged, suggesting that new ideas sprouted when minds were suddenly opened to new ideas presented by interdisciplinary colleagues.

Nassim Nicholas Taleb, author of The Black Swan¹³, predicted the 2008 stock market decline. He also predicts a cure for cancer, believing a breakthrough will emerge by someone with an innovative mind and not tied to established paradigms. Past breakthroughs, such as the discovery of chemotherapy, came from unlikely people¹⁴. Bill Gates, founder of Microsoft, has stated that his biggest worry is about two or more people working somewhere, perhaps in a small garage or dorm room, on a new idea that will challenge and rock his company. Sergey Brin and Larry Page, Google, did just that. Innovation may not necessarily come from academic institutions or established corporations. Anne Wojcicki, and wife of Sergey Brin, launched a consumer-based website for personalized genomics (www.23AndMe.com) – which includes people, not just doctors, as participants in research that is important to them. Anne spent several years in the financial section prior to launching a personal genome website. Such science could not be more strategic for the individual person.

In addition to disease, strategic science is also needed to assess the benefits of the human-animal bond at various life cycle stages. The pet industry is becoming increasingly active in funding this type of work, understanding the business implications from strengthening partnership between people and pets (Table 3). During the recent economic recession, investors learned that the pet

¹² Personal communication, meeting between author (PNO) and Dr. Frank, February 2011

¹³ Nassim Nicholas Taleb, The Black Swan, Random House, NY, 2007

¹⁴ Siddhartha Mukherjee, The Emperor of all Maladies, Scribner, NY, 2010

industry was rather “recession proof” - people believing that pets are part of their families and need care during good times and tough times¹⁵.

Table 3 – Examples of human-animal bond research

The Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) and The Waltham Center for Pet Nutrition (a division of Mars, Inc.) entered into a public-private partnership in 2008 to explore the interaction between humans and animals. The partnership encourages research on human-animal interactions as they relate to child development, health and the therapeutic use of animals with children and adolescents. The goal is to build empirical research on how children perceive, relate to and think about animals; how pets in the home impact children’s social and emotional development and health (e.g., allergies, the immune system, asthma, mitigation of obesity); and whether and under what conditions therapeutic uses of animals is safe and effective

Pfizer Animal Health is funding research conducted by the American Humane Association, a charity with divisions to protect both animals and children. The project will assess the benefits of dogs for children with cancer. Other work on the human-animal bond will be funded at Purdue University, an institution long known for its interest in expertise in this area

Carol Gardner, the founder of Zelda’s Wisdom greeting cards, will be launching a program to introduce rescued dogs to children’s hospitals. Carol is committed to careful design and assessment for evaluating outcomes. If outcomes are positive, interesting and important programs could be established throughout the U.S. and elsewhere

Banfield The Pet Hospital – a group of approximately 800 pet hospitals in the U.S. – has collaborated with Purdue University and the Centers for Disease Control to develop a national surveillance system to provide early-warning signs for disease outbreaks. As pets have become a significant family member, there is interest in monitoring these animals should a zoonotic disease emerge whereby a pet could transmit a serious disease to the human family members. Most pets live closely with their owners and even sleep in the same beds¹⁶. Dr. Larry Glickman, an epidemiologist who worked with the Banfield database and CDC to evaluate syndromic surveillance in pets, recently received a grant from the DHS to further his work. Due to the strong human-animal bond between pets and their owners, it is highly unlikely that the public would ever accept massive depopulation of pets during a disease outbreak

Google¹⁷ does its own “global surveillance” as people search for information about various symptoms and diseases

¹⁵ Lauren Johnston, Is the pet industry recession-proof? So far, New Yorkers still spending on pets, NY Daily News, 3-31-2009

¹⁶ AAHA online, January 2011, citing Veterinary Pet Insurance Survey

¹⁷ www.Google.com/trends

With an ever-increasing human-animal bond, depopulation of companion animals would be almost impossible should a serious zoonotic disease ever emerge. Animals are now considered part of the American family and destroying them would be intolerable to many pet owners.

Strategic science for companion animal medicine needs to address both populations of animal and individual animals. For veterinary and pet industries to survive, so must their future customers/patients. Perhaps no example better describes how partners can work together than pet overpopulation. When a social issue is addressed, animal lives are saved and businesses stand to gain additional revenue (Table 4.)

Table 4 – Examples of partners addressing pet overpopulation and keeping pets in their homes

National Council on Pet Population Study and Policy (NCPSP) - In the early 1990's, veterinary colleges were initially slow to respond to requests from national and regional humane organizations to scientifically address "pet overpopulation". Fearing that shelters wanted nothing more than free or low-cost spay/neutering services, the veterinary profession was hesitant to evaluate the issue. When the NCPSP was founded in 1993, scientific studies were finally funded which identified over seventy risk factors for relinquishing pets to shelters. A significant cause of relinquishment was animal behaviors that were deemed inappropriate by owners. Other causes were children being allergic to cats, families moving into apartments that did not allow for pets, etc. The veterinary profession finally recognized the economic loss (conservatively estimated at \$2 billion/year) for relinquishing a pet early in its life and various groups began to develop intervention strategies (e.g. puppy classes at pet stores/clinics). The partnership between academic science, industry partners, shelters and the veterinary profession has now been credited with a significant reduction in euthanasia rates at animal care and control facilities over the past two decades. Millions of dogs and cats were saved from death. Such strategic science serves as an example on how science can be effectively used to address a significant problem. Businesses can implement rational interventional strategies with sound scientific information, allowing animals to enjoy longer, healthier lives in their homes while at the same time increasing revenue for their industry. Although the impact of such science was profound, it is interesting to note that some of the scientists who worked on the project struggled at their academic institutions to secure tenure for their work. Their funding to reduce the most significant cause of euthanasia in pet animals had not come with the desired overhead and their work was focused more on prevention than treatment. While owners frequently indicate that prevention is of prime interest, scientists are often forced to consider research that yields licensing and royalty revenue (e.g., developing a new drug for treatment). Securing funding for prevention research, especially when business opportunities are less clear, is difficult. Yet, as the NCPSP demonstrated, funding can be secured, collaborative research can be conducted, and interventions can be developed and provided by successful businesses

American Humane Association's Animal Welfare Research Institute - Work is now continuing, with renewed interest, to determine why 7-20% of pets adopted from shelters are still returning within the first six months following adoption¹⁸. Although considerable progress has been realized, more work needs to be done to support pet owners during the first months of ownership as the human-animal bond solidifies

American Humane Association and Mars Incorporated – Are now partnering to look at humane communities, addressing issues that affect both pets and people

¹⁸ Retention proposal, 2011, American Humane Association's Animal Welfare Research Institute

The public has a keen interest in advancing scientific knowledge to advance companion animal health and welfare. This is especially true when no animals are harmed in such research endeavors¹⁹. Businesses are learning that customers are more likely to purchase a “similar” product when the company supports research that seeks to advance the health and/or welfare of animals²⁰. Recent venture capital companies are including philanthropic activities into their for-profit business plans. Corporate and venture capital interests in philanthropy will likely increase as a means to increase revenue as pet owners seek more services and products. The number of pet owners in the U.S. continues to be high, although a drop in cat numbers was recently reported. According to the 2011/2012 APPA National Pet Owners Survey²¹, pet cats in the U.S. have declined (86.4 million estimated from the 2011/2012 survey vs. 93.6 million estimated from the 2009/2010 survey) and pet dogs are not increasing significantly (78.2 million vs. 77.5 million).

Although research was historically often considered an ugly word by humane organizations, they now recognize the benefit of strategic science to advance both animal health and welfare. In 2011, the American Humane Association launched a new Animal Welfare Research Institute²². Strategic science is part of the mission statement: *American Humane Association's Animal Welfare Research Institute funds strategic science and training programs to advance the health and welfare of animals and in doing so may also advance the health and welfare of children*. The Institute will be specifically funding training programs for veterinary students and fellows. Thus, nonprofit groups are attempting to fill a gap in research and training funds for the veterinary profession.

¹⁹ Rollin, Bernard – Principal Investigators Association, July 10, 2010

²⁰ Richard Stecekel – Making Money While Making a Difference: Now to Profit with a Nonprofit Partner, 2000

²¹ American Pet Products Association – Industry Statistics and Trends, 2011/2012 survey, americanpetproducts.org

²² www.americanhumane.org

Equine Research: Securing research funds for the horse is complicated by how “horse” is defined – companion animal vs. livestock. Funds provided by the USDA for animal research is solely for livestock (including horses), and has been significantly cut in recent years or redirected. Owners of horses are primarily concerned about their animals dying from colic or laminitis²³, but almost no federal funding goes toward researching these diseases. In fact, changes in USDA funding priorities for 2010 no longer include an allocation of funds specific for equine research, or for equine disease surveillance and control of disease. Some research funds are available from the American Quarter Horse Association, Grayson-Jockey, American Association of Equine Practitioners, Morris Animal Foundation, and other groups – but these funds are minimal and can rarely sustain larger cooperative, multi-institutional studies that are required to pool cases, share samples, and collect data for significant discovery.

According to the American Horse Council (AHC)²⁴, there are 9.2 million horses in the United States. The 2011/2012 APPA National Pet Owners Survey put the recent number at 7.9 million. This lower number may partially reflect a decline resulting from the recent economic recession. Differences in numbers may relate to how a “horse” is defined (e.g., industry animal, companion animal, farm animal, working animal, wild animal, etc.). According to the AHC, the horse industry has a direct economic effect of \$39 billion/annually on the U.S. economy and a \$102 billion impact when the multiplier effect of spending by industry suppliers and employees is taken into account. Based on the economic impact of the industry, it is difficult to understand the lack of research dollars to advance equine health and welfare. Part of the reason for failing to fund equine research by owners²⁵ may relate to the cost of owning a horse, which is far greater than owning a typical dog or cat. The reasons whereby equine industries (e.g., insurance, food, events, etc.) fail to fund research to reduce morbidity and mortality is less clear.

The horse is in an “interesting category”, with Americans arguing over whether or not the animal is livestock, food, or companion. In the early 1900’s the horse was primarily used for work and owned by men. The average horse owner today is a married female, age 35-54, with kids between the ages of 12 and 17²⁶. She

²³ Survey of donors - Morris Animal Foundation, 10200 E. Girard Ave., Denver. CO 80231

²⁴ American Horse Council web site, 1-17-2011

²⁵ 2004-2010 - Most revenue obtained from Morris Animal Foundation donors was for funding pet animal research, not equine

²⁶ ©2010 Pennsylvania Equestrian - P.O. Box 8412, Lancaster, PA 17604

enjoys country music, hiking and outdoor activities, read lots of publications, and owns cats and dogs.



THEN

Early 1900's - men were primary users of horses for work



NOW

2000's - women are primary owners

A significant issue affecting horses in the U.S. is the current "unwanted horse issue". Unwanted horses represent a subset of horses that are deemed no longer needed/useful or wanted by owners who are unable to care for them physically or financially. Until 2007, many of these animals were sent to U.S. slaughter facilities with others exported to Canada and Mexico.

Since FY2006, Congress has annually prohibited the use of federal funds to inspect horses destined for food, effectively prohibiting domestic slaughter in the U.S. A recent GAO report describes the history of issue²⁷. This legislation partly stemmed from animal rights groups, horse enthusiasts, and some state governments. There was also concern about use of horsemeat for human consumption since drugs commonly used to treat horses cannot be used in food animals. Those favoring the resumption of equine slaughter facilities, and those who do not favor resumption, agree that the current welfare status of many horses in America is not good. Research to address humane transport of horses (interstate and internationally) is needed. Research to address humane euthanasia and proper disposal is needed. Research to address risk factors for why the human-horse bond fails, beyond economic factors is needed. Research to address overall equine health and welfare trends is needed. Research to assess overall horse numbers and types is needed.

Owners of horses are very concerned about horse welfare. In a recent survey²⁸, 63 percent of horse owners indicated that the unwanted horse issue was their top issue of concern, supporting the need for relevant scientific study and action in this area. The cost of keeping a horse (44.4%), the loss of trails and riding areas (35.3%), owners who don't understand horses (30.2%), and the lack of the option of slaughter (30.0%) were the next most frequently identified issues. Certainly, economic issues are involved with the entire "unwanted horse issue" (Table 5), but other significant risk factors need to be identified. Strategic, collaborative science could help.

²⁷ GAO report on Horse Welfare (GAO-11-228); June 2011

²⁸ American Horse Publications - 2010

Table 5 – Example of economic factors and unwanted horse issue

Loss of revenue from sale; cost of euthanasia/disposal - When horses were previously taken to slaughter facilities, owners were likely to obtain some revenue from the sale of the animal. Because the cost of euthanizing and disposing a horse is significant, there was immediate concern that horses would be abandoned with the closing of slaughter plants. This cost differential may be as high as \$800 (\$400 lost revenue from the sale of a horse + \$400 for euthanasia and disposal)²⁹. Unlike pet dogs and cats, there are almost no humane shelters that will accept a horse for euthanasia and disposal. The environmental impact of disposing of a large animal is also a concern, with veterinarians cautioned about the resultant residues. Crematoria for large animals are not available or practical in most locales

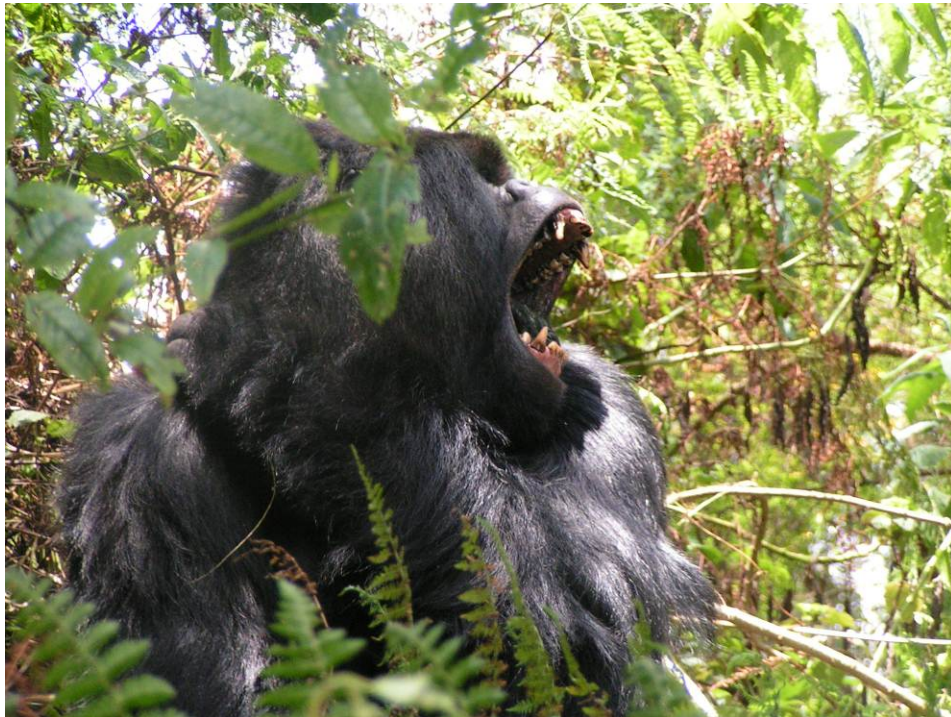
Tax implications - Because horses are considered livestock, tax incentives may be different than for owning most pet dogs and cats. For example, horses can be donated to academic institutions for research with owners obtaining a tax write-off for the contribution. This does not occur for dogs and cats. While some owners are extremely attached to their horse, others use the horse for competitive events and are more likely to sell or dispose of the animal when it is no longer winning

Abandonment - Although numbers are unavailable, there are reports that state and national parks have experienced an increase in abandoned horses on public lands. Although the unwanted horse issue is significant for an animal considered an icon of America and the Wild West, there have been amazingly few research studies to critically evaluate various risk factors for horse relinquishment/abandonment

Federal programs - Madeleine Pickens, wife of billionaire Texas oilman T. Boone Pickens, has been an active advocate for horses that roam on federal lands. Because land available to the mustangs has been reduced, the U.S. Bureau of Land Management has conducted roundups to thin the herds. If the animals cannot be auctioned or adopted, they are destroyed – another issue of high importance to animal advocates. Again, scientific data on the exact number of animals and associated injuries from roundups are lacking, as are data on the impact of horse overpopulation when roundups do not occur

²⁹ Personal communication, Dr. Ed Blach, Monument, CO, January 26, 2011

Wildlife Research: The Morris Animal Foundation reports to be the largest nonprofit funder for companion animal and wildlife research in the U.S. Since 1967, the Foundation has funded work worldwide to develop normal laboratory values, anesthetic protocols, and drug regimes for many wildlife species. The Mountain Gorilla Veterinary Project was established in 1986, attempting to save the highly endangered Mountain Gorilla in Central Africa. According to the Foundation's web site³⁰, examples of current studies include those aimed at saving the North American Clouded Leopard, determining causes for the decline of amphibians, assessing the grieving process of elephants, and advancing reproductive assisted technologies for animals in captivity (i.e., zoos). Yet, the Foundation's funding level for individual wildlife projects is cited at an average of \$50,000/year with less than \$2 million total awarded annually, hardly enough to save the planet's many endangered species through collaborative research efforts.



Mountain Gorilla – photographed in 2004 (P. Olson)

Mountain Gorilla Veterinary Project

³⁰ www.morrisanimalfoundation.org, January 2011

Interestingly, federal agencies often apply for grants from nonprofit foundations. Morris Animal Foundation has funded work by scientists at the USFWS and the Smithsonian's Conservation and Research Center. Just as with companion animals and horses, the federal government does not adequately support research for advancing wildlife health. As human populations further encroach on wildlife habitat, it becomes essential that such research is conducted to protect the animals and also minimize the spread of disease from wildlife to humans, pets and livestock. New types of infections in pet dogs are reportedly being introduced from wildlife species (e.g., leptospirosis). Prairie dogs living near housing developments can transmit plague. Migratory birds remain of concern for potential spread of avian influenza – a disease that killed millions of people in the early 1900's.

Significant research questions include those that consider the role of climate change and human population growth on overall animal health and welfare. Interdisciplinary projects are needed to determine numbers of animals remaining in a species, interactions and movements, vector populations, economic stressors, human populations, and animal/human health trends. Currently, data on all of these parameters is minimal. It is often stated that veterinarians are the physicians for all non-human vertebrate species. The number of vertebrate species is given at approximately 60,000, suggesting that veterinary medicine has lots of unfinished work!

Food Animal Research: The USDA's National Institute of Food and Agriculture (NIFA) and its land-grant university partners collaborate with industry and other interested parties to develop and disseminate knowledge and methods to improve agriculturally relevant animal systems. NIFA states that sufficient, science-based animal agriculture translates into affordable and high-quality food for the consumer³¹, yet research to advance food animal health and welfare is less than many other programs funded by USDA (Figure 1).

NIFA's animal-related research programs cover beef cattle, dairy cattle, poultry, swine, aquaculture, sheep, goats and horses. These activities are prioritized on approaches that lead to economically sound strategies (e.g., reproductive efficiency, food security, interstate and international transport, product quantity and quality). NIFA also interacts with scientists, industry, producers, animal welfare organizations and animal activists in addressing animal well-being – understanding that consumer confidence is based on protecting animals from

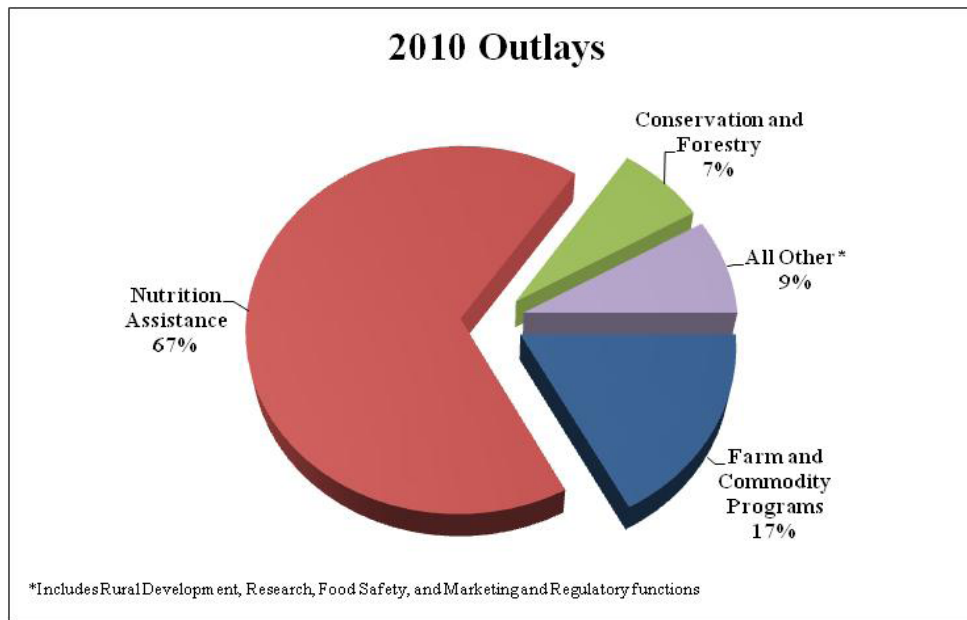
³¹ NIFA – USDA website, 1-17-2011

harm and fear. In addition, farming of the future may see rapid expansion in other species, such as farmed fish/aquaculture.

Limited funds from USDA's overall budget are directed toward food animal health research. Both intramural and extramural research funding for research decreased in 2010. This decline occurred at a time when there are considerable global threats on biosecurity and food safety, and when the Centers for Disease Control (CDC) estimate that each year roughly 1 out of 6 Americans (or 48 million people) gets sick, 128,000 are hospitalized, and 3,000 die from foodborne diseases³².

³² CDC website, December 15, 2010 information

Figure 1 - PERCENT USDA EXPENDITURES



67% for nutritional assistance, such as school lunch program
17% for farm/commodity programs
9% for rural development, research, food safety, marketing and regulatory
functions (food animal research funding low)
7% for conservation and forestry

Questions to be considered when building strategies for veterinary medical science:

1. **What are reliable and available statistics for morbidity and mortality trends for different species (dogs, cats, horses, wildlife, and food animals)?** The responses to this question will identify priority issues to be addressed for research and future direction of the veterinary profession
2. **How are scientific teams convened, to span diverse disciplines and institutions and countries, to address issues as diverse as food safety, pet cancer, mutating viruses in wildlife, etc.?** The responses to this question will lead to strategic approaches for interdisciplinary partnerships with other institutions/agencies/corporations to satisfy societal demand and expand the outlook of the veterinary profession
3. **Who are the key stakeholders for each group, allowing funding levels to rise and strategies to be based on rational objectives?** The responses to this question will determine funding opportunities and enhance the partnerships with allied groups
4. **Are academic centers capable of conducting strategic science even if funding is obtained?** The responses to this question will allow decision makers and others to adjust the direction of the academic centers toward providing better value for multiple stakeholders, including the animals that they serve. Researchers must be allowed to conduct science and not be distracted by other duties
5. **What are the business opportunities for advancing strategic science?** The responses to this question will allow for preventative and proactive research, building a plan to optimize outcomes for animal (and human) health and allows for implementation/commercialization of interventional strategies

Education

Responding to critical issues for veterinary medical education, the American Association of Veterinary Medical Colleges (AAVMC) established the North American Veterinary Medical Education Consortium (NAVMEC) in 2008³³. NAVMEC held three national meetings with approximately 400 stakeholders to identify the changing societal demographics and needs of veterinary medicine, create a shared vision for what core competencies are for graduating veterinarians, and identify changes that are required to meet society's evolving needs.

Core competencies agreed upon by NAVMEC participants included the following:

- Multi-species clinical expertise - This competency, with its emphasis on comparative medicine, distinguishes the veterinary profession from other health professions; diagnostic, prevention, and therapeutic skills, animal behavior, wellness, and welfare
- Public health/One Health knowledge and expertise - Prevent, diagnose & control zoonotic diseases; food safety & security, emergency preparedness & response, human-animal bond benefits
- Interpersonal communication - Effective interactions with clients, team, colleagues & community
- Collaboration - Work within a healthcare team to achieve optimal patient care, client service, or other desirable outcome
- Management (self, team, system) - Efficient operation of business; financial literacy; resource management
- Lifelong learning, scholarship, value of research - Critical thinking, problem solving & curiosity; self-directed learning

³³ NAVMEC Draft Recommendations, 31 October 2010

- Ethics & professional leadership - Committed to health & welfare of patients, needs of clients
- Diversity/multicultural awareness - Understanding and accepting of all societal diversity, including (but not limited to) racial, ethnic, gender, sexual orientation, socioeconomic and cultural; working in multicultural teams, knowing how to provide the most appropriate veterinary medical advice to a diverse clientele
- Adapt to changing environments - New technologies; role of animals; societal norms

NAVMEC proposed a multi-college academic panel to develop admission and curricula criteria. A national PR campaign, in partnership and collaboration with national veterinary organizations and state veterinary medical associations, was also proposed to fund a viable veterinary medical education system. The dearth of peer-reviewed research on factors impacting veterinary medical education was acknowledged, thereby limiting an evidence-based approach to address the challenges.

Significant issues were identified by NAVMEC for the profession:

- Less than 2 percent of the U.S. population now lives in rural areas, and veterinary medicine no longer primarily serves small family farms
- The world's population is approaching 7 billion which will have a profound impact on the veterinary profession – in the U.S. and globally
- The chasm between types of services is widening (e.g., specialist vs. generalists; small rural farms vs. large agribusinesses)
- Financial support by state and federal agencies to Land Grant Universities has declined
- The average student loan debt has risen to \$134,000 at the time of graduation; starting salaries to retire such a debt have not risen as rapidly as debt
- National and state licensing examinations may not be adequate or contemporary

- There is a significant downward trend in applicants to professional veterinary medical programs (currently at 2.1:1)

What needs to follow the NAVMEC report is a critical and rapid assessment of future needs, but one conducted outside of academic veterinary medicine or the veterinary profession. It is difficult for overworked academicians and professionals struggling economically to conduct an unbiased assessment.

Currently, students are educated in “cookie-cutter” fashion at most veterinary colleges rather than to meet societal needs and ensure a profitable livelihood. Because of state funding cuts or declining endowments, many schools have increased the cost of tuition while at the same time modifying their objectives beyond teaching students or conducting strategic science. To generate revenue, objectives from new financial partners often need to be highly prioritized and met on defined timelines – diluting the efforts required for teaching students. Colleges often lack business acumen amongst their faculty, furthering the challenges for running efficient and profitable teaching/research programs.

Graduating veterinarians, often in debt, may question the focus and value of their education. According to one report³⁴, seventy-one percent of associates in clinical practices are unlikely to ever own a veterinary practice. Many factors have been cited to contribute to this increasing trend (the number was forty percent in 2003) – gender switch, professionals wanting more work-life balance, student debt, etc. One author paints a grim picture when asking veterinary students “How much is your knowledge going to be worth once you graduate?” and then telling them that “A veterinary associate is worth \$35 an hour³⁵”. Foreign-trained veterinarians are frequently appointed deans, provosts and presidents at our colleges – a testament to their skills, and perhaps also to the fact that many U.S.-trained veterinarians have sufficient educational debt to preclude entry into graduate training programs (often required for college/university administrators). Academic institutions have attempted to help students interested in a research career by providing them with an opportunity to obtain a combined DVM/PhD degree. While this compacted

³⁴ Veterinary Economics, State of the Industry Study, August 2010

³⁵ Opperman M, Veterinary Economics, January 2011

approach might help with student debt, graduates often complain that they may not be part of a permanent class (i.e., students in some combined programs take time off from veterinary studies to conduct thesis research, joining a subsequent veterinary class) and feel a lack of “connectedness” to any one class or group of classmates. Some academic and industrial researchers question the quality of the PhD obtained in combined programs, and some veterinarians question the quality of the veterinary medical training. Should a student not be able to finish this program, they might have neither a veterinary or graduate degree.

It seems that the veterinary medical education system needs more input from prior graduates – spanning multiple disciplines – to determine how to structure future educational programs. Graduates might be surveyed 1, 5, and 10 years following graduation to determine how well their education prepared them for their professional careers. Gathering information on the number of veterinarians leaving the profession, and the reasons for exiting, seems critical.

Colleges/schools might also want to survey the largest employers of veterinarians in the U.S. (e.g., federal government, corporate veterinary businesses, industry, etc.) to determine future needs. Are more bilingual veterinarians needed? Are more veterinarians trained in food safety required? Outcomes from the schools, and associated costs/student, would be important data to gather. For example, Tuskegee educates their students for less than many other schools, yet these students often assume leadership positions – including those in industry and in the federal government.

Clearly, many facets of our current education system need to be addressed.

Issues to Consider for Education for Veterinary Medical Education in the U.S.:

- 1. Determine veterinary workforce needs/types for the future (NRC Report or other unbiased reports)**
- 2. Determine the most effective methods to educate students for societal/global needs (i.e., does someone wanting to be involved in hog management systems need to be trained in feline medicine?)**
 - a. Determine how to best educate veterinarians for global/one health issues (i.e., pathogens know no borders)**
 - b. How can students be trained along side of physicians and other professions, both in the U.S. and elsewhere, to address the health issues affecting all?**

3. Determine the “loaded” cost for training a veterinary student under today’s paradigm, and assess some models for cost-savings programs to meet future workforce needs (e.g., paraprofessional models, schools specializing in fewer areas)
4. Work with business schools (e.g., Harvard, Wharton School, Carlson, etc.) and businesses (e.g., banking/investment) to identify both revenue and expense challenges and opportunities
 - a. Might business schools be able to assess the gender shift in the veterinary profession and how it varies from other professions, including business schools?
 - b. Is the veterinary profession fragmented whereby services are not efficiently provided vs. there is an overall shortage of veterinary services?
5. Assess implications of academic tenure on advancing innovation

Societal needs/expectations and Business Opportunities across major species categories

Societal needs and expectations are demanding that the veterinary profession be nimble in addressing future needs. This is a daunting task since the diversity of expectations is growing, many of which may not be conducive to the traditional model of veterinary education and delivery.

Dogs, Cats, Other Pets

In 2003³⁶, Consumer Reports published an assessment that the price of veterinary services for pets had increased twice the rate of overall inflation, partly due to new technologies and diagnostic modalities (e.g., pace makers, kidney transplants, CT scans). In 2011³⁷, Consumer Reports published another article on how owners might curb expenses. Among recommendations were those that pet owners might want to “shop” for cheaper veterinary services, and that the feeding premium pet food was unnecessary. It is interesting, that one of the most common queries by owners (i.e., what to feed a pet) has still not been answered through completely independent research.

The ever-rising standard of care, and associated costs, are preventing many owners from seeking veterinary services. Veterinarians are reluctant to offer

³⁶ Veterinary care without the bite, Consumer Reports, July 2003

³⁷ Tame your pet costs, Consumer Reports, August 2011

lesser diagnostic and therapeutic options, fearing liability (malpractice) issues when the “standard of care” varies based on an owner’s ability to pay. According to the American Animal Hospital Association³⁸, an increasing number of pet-owning households are not spending money on veterinary care. Veterinarians attempted to address this issue during a track on ethics at a recent AVMA Conference³⁹. Should animals and owners coming to emergency clinics be turned away if they are unable to pay? How might the profession offer care that is somewhere between euthanasia and doing everything possible?

Information from the Bureau of Labor Statistics suggests that owners who are younger, less well educated, and not Caucasian are significantly less likely to seek veterinary care for their pets⁴⁰. This does not necessarily equate to owners who do not love their animals.

A recent study⁴¹ reported there was a strong human-animal bond among Hispanic pet owners in the United States and Mexico - similar to non-Hispanic White owners. There was no observed association between owner race-ethnicity and strength of the human-animal bond for Hispanic and non-Hispanic White pet owners in the United States. Similarly, Hispanic pet owners are highly represented in purchasing wellness plans from The Banfield Pet Hospitals – another indicator of their commitment to the health of their animals⁴². Morris Animal Foundation conducted a survey of approximately 1,102 people who did not own a cat. The group most likely to consider future cat ownership was comprised of young Hispanic men⁴³. This could equate to a large group of new owners and services. How might the veterinary profession address owner needs, thereby sustaining our professional goodwill and helping owners and their beloved pets (Table 6)?

³⁸ Aahanet.org – economic bulletin 0710

³⁹ Overcharging/Overtreatment - A. Villalobos, July 18, 2011, Ethics Track, AVMA Conference, St. Louis, MO.

⁴⁰ Wolf CA et al., An examination of U.S. consumer pet-related and veterinary services expenditure, 1980-2005, J Am Vet Med Assoc, 233(3):404-413, 2008

⁴¹ Regina Schoenfeld-Tacher, et al., J Am Vet Med Assoc, 236(5):529-534, 2010

⁴² Comment by Dr. Hugh Lewis, former Head of DataSavant, at a Morris Animal Foundation board meeting, 2008

⁴³ Happy Healthy Cat Campaign – Survey of potential cat owners, Morris Animal Foundation, 2009

Table 6 – Addressing the needs of U.S. pet owners

Is it possible that people among various demographic sectors prefer health care for their animals provided in diverse ways? Why are cat visits to veterinary offices continuing to decline?

Working schedules and family commitments may not engender the traditional delivery systems for pet care. How might new models of health delivery be developed? (i.e., consider report from a prior working group, *An Idealized Design of a North American Companion-Animal Healthcare System*⁴⁴, and review recommendations)

There might be tremendous opportunities for future industry growth if the diversity of future animal owners is considered (younger pet owners obtain information via social media and the Internet). How might owners become more participatory in their animals ongoing health needs?

Issues that will challenge the veterinary profession include over-the-counter (OTC) medications purchased by pet owners without the need for a veterinarian's prescription, vendors and consumers challenging state practice acts on services that might be provided by someone other than a licensed veterinarian, higher societal demands for improving animal welfare, delivering services to customers with differing abilities to pay, and services provided outside of the veterinary profession (animal behavior classes, pet sitting, dog walking, grooming, holistic therapies, web-based health information, animal assisted therapy)

Colorado recently passed legislation that allows a licensed physical therapist to perform therapy on an animal with a referral from a licensed veterinarian. This resulted from owners seeking specialty care, at affordable prices, that was unavailable from the traditional veterinary practice.

Cost is a considerable issue to address for the U.S. pet population and may be a significant driver for owners seeking non-veterinary providers. The cost for

⁴⁴ Bovee KC et al., *An Idealized Design of a North American Companion-Animal Healthcare System*, Published on behalf of the Companion Animal and Family Health Council, 1996

cleaning a dog's teeth at a veterinary clinic ranges from \$70 to \$350⁴⁵. The average claim submitted to Veterinary Pet Insurance for dog teeth cleaning is \$292. The cost varies depending on blood work and anesthetic fees. Because few veterinarians or owners challenge the benefits of good dental hygiene for pet longevity, there are industries interested in providing this service at a reduced cost. To date, state veterinary boards have challenged such activities. Interestingly, dental work can now be performed by non-veterinarians (even with minimal training) on horses in Oklahoma (see below). Some Departments of Animal Science are positioned to provide a four-year training program to a new group of paraprofessionals; some of which might be able to effectively challenge existing state practice acts.

In 1996, a "Family-Pet Care and Educational Center" model was proposed. This resulted from work on behalf of the Companion Animal and Family Health Council⁴⁴. Such a center would provide education, services, goods and wellness support to the public. It would enable and motivate families to optimize the health of animals and enhance the value of the human-animal bond and serve as a resource for human-animal health. Services could include one-stop shopping for both animal and human health needs/vaccinations. Since the time this "Medical Mall" was proposed in 1996, it is interesting to note that grocery stores, drug stores, and other retail groups are now offering a variety of vaccines to people. A national system for adding pet care to these services has not yet been well developed.

In 2011, pet owners are asking for, and willing to pay, for information and services that add value to their animals. Thus, it seems that the veterinary profession must critically evaluate what services listed under state practice acts truly require a licensed veterinarian, and what services could be more efficiently delivered to America's pets - perhaps at a reduced cost - by other providers (working under veterinary supervision or working as part of another profession). These decisions can then direct future educational programs and industries for delivering the needed services. The goal would be to provide animal owners with efficient service and for veterinarians to command fees commensurate with their extensive education and value of services. Just as dentists no longer do routine cleaning of teeth, and physician assistants have relieved medical doctors of routine work, perhaps veterinarians need to evaluate the benefits of additional paraprofessionals. In all cases, the value of a service to an animal must be clearly defined to an owner and based on sound evidence. It seems that pet owners are continuing to seek services for their pets, even if those services are not always obtained through the veterinarian.

⁴⁵ www.costhelper.com – dog teeth cleaning

**APPA estimated that \$47.7 billion would be spent of U.S pets
(2010)**

Food	\$18.28 billion
Supplies/OTC Medicine	\$11.01 billion
Vet Care	\$12.79 billion
Live animal purchases	\$2.21 billion
Pet Services: grooming & boarding	\$3.45 billion

As veterinarians begin to think about future services that they might provide, they need to consider the rapidly changing field of personalized genomics. It is most likely, that in the future veterinarians will be providing services by helping their clients understand the genetic traits in individualized pets. Such personalized genomics is already occurring in medicine⁴⁶, with deans of medical schools attempting to determine how to educate future physicians in reviewing genetic data as part of patient care. Leroy Hood at the Institute of Systems Biology describes the future of P4 medicine (Predictive, Preventive, Personalized and Participatory)⁴⁷. The same could be said for veterinary medicine. Veterinarians already understand that different breeds have different risks for disease, drug reactions and longevity.

⁴⁶ www.23AndMe.com; www.personalgenomes.org

⁴⁷ www.systemsbiology.org

Issues to Consider for Delivering Services to Pets

1. Is there a need for an entirely new form of delivery of health services to pet owners (e.g., paraprofessionals beyond veterinary technicians) that could allow more pets to be served at affordable costs?
 - a. Survey diverse set of customers (past, current and potential) on where they currently seek health care/information
2. What are the services that a general small animal veterinarian is able/required to deliver – define roles for paraprofessionals, generalists and specialists and train appropriately
 - a. Assess business models for a new “pet animal health” delivery system
3. What research data are needed whereby businesses might seek opportunities for product/service development?
 - a. Internet surveys of health/disease
 - i. Define health and disease trends among various species?
 - ii. How might the internet be utilized to recruit owners to participate in research, along with their pets?
 - iii. How can accurate health information be provided to owners?
 - iv. How might the internet be used to assist with real-time surveillance of disease?
 - b. What are the risk factors for human-animal bond breakage at various life cycle stages?
 - i. How might the retention of pets in homes be further increased (people spend more/pet on veterinary services as the animal ages)?
4. How might businesses work with the 6000+ animal care and control facilities (shelters) and rescue organizations to increase pet services?

- a. Convert relinquished, rescued, and abandoned animals to permanent pets
- 5. How could medical and veterinary researchers collaborate, utilizing the skills of each, to yield significant R&D for health and disease through assessing common risk factors for all family members (pets and people)?
 - a. Genetic – personalized medicines, drugs and diets
 - b. Environmental – toxins that affect both pets and children
 - c. Dietary – unbiased research on nutrients and health
- 6. How might pharmaceutical organizations and philanthropic agencies come together to fund strategic science for pets and people?
 - a. Shorter lifespan and multiple births of pet animals can lead to rapid discovery in well-designed studies
 - b. Pharmaceutical discovery for humans could benefit pets from “second-to-lead” drugs
- 7. How might the veterinary profession become involved in a “National Commission” effort to address sustainable communities, better meeting the needs of both pets and people?

Horses

The equine industry includes companion animals, animals used for events, horses in therapeutic riding programs and animals used for other forms of work. The exact number of owned horses in the U.S. is an estimate. USDA reported⁴⁸ that numbers vary, depending on the criteria for gathering the information and definition of “horse”. The exact number of wild horses is also unknown.

In October 2009, American Horse Publications launched a survey of American horse owners and caretakers to gauge trends in the equine industry. The survey was publicized through local and national equine publications and websites as well as social networking sites like Twitter and Facebook. Over 11,000 usable responses were gathered. The goal of the survey was to identify trends in equine activity participation, find out what issues are currently most important to members of the horse community, and to analyze equine health issues.

⁴⁸ Unwanted Horse Summit, Morris Animal Foundation, Denver, CO, 5/2009

Respondents listed the following uses of their horses:

How do you use your horses? (Please check all that apply.)		
Answer Options	Response Percent	Response Count
Barrel racing	10.2%	1,094
Breeding	19.8%	2,136
Breed shows	17.8%	1,917
Combined	9.6%	1,032
Cutting	3.2%	350
Dressage	26.3%	2,838
Driving	9.6%	1,036
Endurance	5.2%	564
Fox hunting	5.3%	570
Hunters	12.9%	1,387
Jumpers	10.6%	1,141
Lessons/Training	25.1%	2,702
Natural Horsemanship	22.7%	2,446
Pleasure/Trail Riding	73.5%	7,919
Polo	0.5%	57
Racing	2.6%	282
Reining	7.2%	772
Rodeo	4.5%	481
Roping	4.9%	529
Saddleseat	2.6%	278
Steeplechasing	0.3%	30
Team Penning	5.1%	553
Working (ranch horses,	11.6%	1,248
None of these	1.5%	167
Other (please specify)	16.5%	1,781
answered question		10,776
skipped question		412

The #1 issue of concern to respondents (> 60%) was the unwanted horse issue. Although most respondents indicated that they obtained their health information from their veterinarians, this was more likely to occur with older respondents. Those aged 18-24 were the least likely to talk to their veterinarians. Those aged from 25-55 were more likely to seek out horse care information online.

Just as pet owners are seeking services from non-veterinary professionals, so are equine owners.

Issues to Consider for Delivering Services to Horses

1. Determine risk factors for relinquishing a horse at various life cycle stages for humans (adolescence, college age, single-working, married, single-divorced, etc.)
 - a. Have businesses and equine industry evaluate risk factors and recommend intervention strategies
2. What are the services that an equine veterinarian is able/required to deliver vs. lay persons – define roles for paraprofessionals, generalists and specialists and train appropriately
 - a. How do services vary across owner demographic sectors?
3. What type of internet, or other, service could be launched to provide horse owners with accurate health/disease information?
4. How might affordable and humane methods of euthanasia and disposal be developed for horses in the U.S.?
 - a. How might the equine industry and animal welfare groups address this issue together?

Wildlife

Wildlife veterinarians and zoological institution veterinarians define themselves somewhat differently. Wildlife veterinarians address conservation and cultural implications for endangered species and other wild species. They might refer to their “laboratories” as the earth’s forests, plains and parks. Zoo veterinarians care for animals at zoological institutions. They attempt to determine how to manage exhibits by reducing stress, adding appropriate enrichments, and identifying causes and cures of diseases that are prevalent in such settings.

To care for the world’s wildlife is a daunting task. The number of species is unknown, but estimates⁴⁹ suggest that there are > 60,000 vertebrate species, with approximately 5,500 mammals, 10,000 birds, 10,000 reptiles, 6,500 amphibians, and 31,000 fish.

⁴⁹ The World Conservation Union. 2010

To evaluate animals within a single species requires understanding physical and laboratory parameters that relate to health and disease. Very little research has been conducted on significant numbers of the world's animals.

While understanding health/disease is remains a challenge, it is also an opportunity. These animals can be sentinels for human health. A Genome 10K project⁵⁰ aims to assemble a genomic zoo—a collection of DNA sequences representing the genomes of 10,000 vertebrate species, approximately one for every vertebrate genus. The trajectory of cost reduction in DNA sequencing suggests that this project is feasible. Capturing the genetic diversity of vertebrate species would create an unprecedented resource for the life sciences and for worldwide conservation efforts. Co-directors for the project span individuals from the National Cancer Institute, University of California – Santa Cruz, and San Diego Zoo's Institute for Conservation Research.

Because veterinary training in the U.S. is highly clinical and focused on small (pets) and large (food animals, horses), it may difficult for students to receive adequate training in zoology, conservation biology, ecology, governmental oversight issues, and veterinary medicine as it relates to wildlife and zoo animals. Veterinarians are needed in diverse global animal production systems for herd and flock management with individual clinical skills less refined⁵¹. Thus, on-one-hand we need specialty training (e.g., wildlife veterinarians with expertise in treating numerous exotic species), while on-the-other-hand these professionals need to be aware of how wildlife transmit diseases to livestock, pets and people (encompassing food animal production, public health, mutating and transmitting viruses among species and more). These professional veterinarians also need knowhow on creating a human-animal bond between humans and entire species of endangered animals – in order to protect both man and beast (i.e., stewardship of the world's animal resources).

⁵⁰ <http://genome10k.soe.ucsc.edu/>

⁵¹ EcoHealth Alliance, March 23, 2010

Issues to Consider for Delivering Services to Wildlife and Zoo Animals

1. What are major health/endangerment trends by geographical location (U.S. and elsewhere)?
2. What are the issues to consider for addressing the interface of wildlife species, livestock, domestic animals and humans?
3. How coordinated are governmental, non-governmental and academic agencies in addressing those diseases of high significance for wildlife health, which also have implications in other species (humans, pet animals, and livestock)?
4. How/where should veterinary students be trained to become wildlife or zoo veterinarians?
5. How can animal advocates and zoo veterinarians work effectively together to address both health and welfare of captive animals?

Food Producing Animals

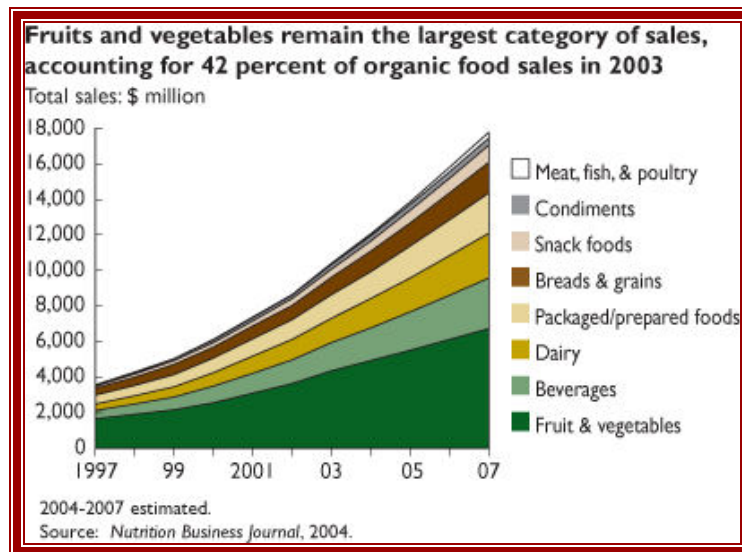
As the planet approaches 7 billion people, food will become an ever-increasing issue. Additionally, people in developing countries will increase their consumption of meat proteins as economies improve. The world's total meat supply was 71 million tons in 1961⁵². In 2007, it was estimated to be 284 million tons. Per capita consumption has more than doubled over that period. In the developing world, it rose twice as fast, doubling in the last 20 years. World meat consumption is expected to double again by 2050, which one expert, Henning Steinfeld of the United Nations, says is resulting in a "relentless growth in livestock production."

The global landscape for food animal production is truly a maze of different production systems. The U.S sale of organic meat, fish and poultry has increased as more consumers worry about food safety, health and animal welfare. Ecovian⁵³, an internet web site, ranks Denver restaurants for "greenness" based

⁵² NY Times, January 27, 2008, Mark Bittman – Rethinking the Meat Guzzler

⁵³ Ecovian.com - Denver

on the amount of organic food, local food, and sustainable seafood on a menu.



Some consumers question why United States is the only developed nation to permit humans to drink milk from cows given artificial growth hormone. Although many food animal veterinarians believe the product to be as safe as naturally occurring growth hormone, long-term health studies have not been conducted. The artificial growth hormone (bovine somatotropin – BST) was introduced by Monsanto to enhance milk production in cows. Although this was deemed by many to provide an economic benefit for producers, milk from BST-treated cows is now penalized. Major retailers, such as Safeway, Kroger, Starbucks and others refused to sell or use the milk. Customers were not convinced that long-term health risks were minimal. Many mothers were not about to risk any health benefits from milk – the Holy Grail of food for children. Consumers are not always convinced that the veterinary profession provides unbiased facts regarding food safety, fearing that the profession is highly aligned with food animal industries seeking additional profits.

Although the US dairy herd continues to show a gradual year-over-year contraction, higher output per cow continues to boost production. Demand, both foreign and domestic continues to improve as both the world and US economies recover. According to information from USDA⁵⁴, there were 9.35 million dairy cows in the U.S. in 2008, 9.2 million in 2009, and 9.1 million in 2010.

⁵⁴ USDA's July cattle inventory report, 2010

The number of dairies in the U.S. has decreased over the past several decades. The number of dairy farms in 1954 was 2.9 million, which dropped to 155,339 by 1992⁵⁵. Conversely, the number of cows/farm increased. Some large dairies today employ their own veterinarian due to the number of animals in a herd.

Veterinarians working for large dairy enterprises require business skills in addition to their traditional veterinary medical training. Analysis of nutrients, prices of commodities, agricultural loans, waste management and reproductive efficiency are examples of issues that can have a significant effect on income. Because the number of cows/dairy in the U.S. has increased, many communities are questioning waste contamination of water supplies. Agricultural engineers are required to work closely with veterinarians and producers. Large dairies are a point of interest for the Department of Homeland Security. Milk safety is a high priority for many federal agencies.

Swine, beef and poultry producers are facing similar challenges. The high water tables and low-lying flood plains in some areas have resulted in concern about the risk and impact of hog farm pollution. The Netherlands instituted a tax on the basis of swine waste. The Manure Law and the Soil Protection Act define regulations; statutory measures for soil protection in the Netherlands originate from the Soil Protection Act (SPA), which came into force in January, 1987.

All food-production businesses are under scrutiny by animal advocates. Food, Inc., a documentary movie created by Robert Kenner, was released in 2008-2009. The movie described intensive food animal production industries and associated diseases. For example, osteoarthritis has been speculated to result from the rapid growth of poultry broilers. Osteoporosis is a significant disease of laying hens. Day-old male chickens, considered a “by-product” of the laying hen industry are routinely killed by maceration, something that many owners are unaware of⁵⁶.

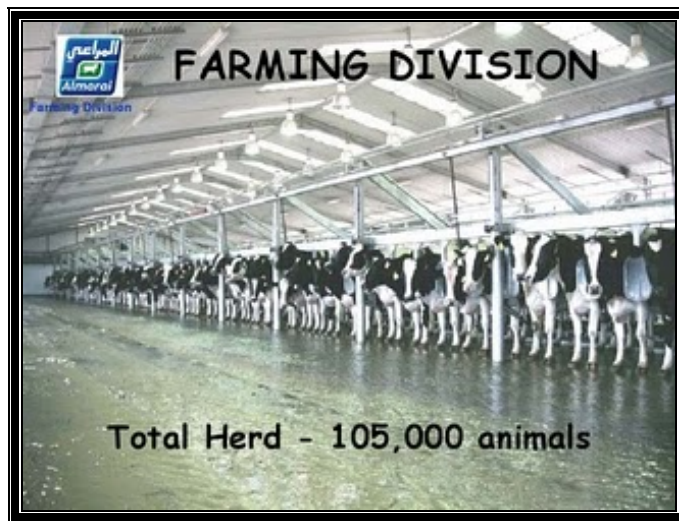
Countries outside of the U.S. present extreme examples for food animal needs. In some countries, a family's survival is dependent on an animal or two. Heifer International has a long history of empowering families with gifts of livestock. They refer to the animals as “living loans” – providing families with a means to prevent hunger and start businesses through self-reliance and hope. Many of these families are without veterinary services.

⁵⁵ Census of Agriculture

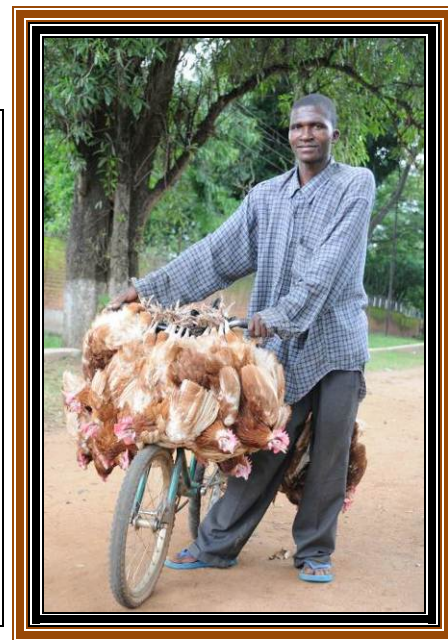
⁵⁶ Leenstra F, et al., Killing day-old chicks? Public opinion regarding potential alternatives, *Animal Welfare* 2011, 20:37-45 *2011 Universities Federation for Animal Welfare*

Even within the U.S., rural communities are frequently lacking veterinary services. While Missouri ranks #2 in the U.S. for states with beef cattle⁵⁷, many farms have 25 cattle or less. Many Missouri farmers are without veterinary service.

In contrast, countries like Saudi Arabia have developed huge dairies in the desert and may employ several veterinarians within their own enterprise.



Large dairy in the Saudi desert



Farmer in Mozambique

Photo – Compliments of
Richard Steckel⁵⁸

Food security and veterinary medicine

Food is the world's energy source and needs additional discussion as we talk about the future role of veterinarians. Food energy source/quality is limited in much of the world, which effects both animal and human health in multiple ways. Approximately one billion individuals in the world lack adequate amounts of food to meet their nutritional needs and are

⁵⁷ Beef Cattle Production, August 2003; Jerry Quinlan, Pfizer Animal Health, January 27, 2011

⁵⁸ Richard Steckel, The Milestones Project, Denver, CO; photograph of young man in Mozambique with his poultry

malnourished⁵⁹. Malnourished individuals are unable to consume adequate amounts of macronutrients and micronutrients. Macronutrients include protein, fat and caloric content⁶⁰, and micronutrients are the essential minerals and vitamins⁶¹. The consequences to macronutrient malnutrition are poor immune response, stunted physical and mental growth, lethargy and emaciation⁶². Malnutrition of micronutrients such as iron, vitamin A and iodine result in anemia, decreased immune system function, cretinism, blindness and cognitive impairment.

Twenty countries in Africa, Asia, the Western Pacific and the Middle East account for four-fifths of global macro- and micronutrient malnutrition. In these areas approximately 3.5 million deaths occur per year in children under five, and the deaths are attributed to illness related to undernutrition⁶³ ⁶⁴. The World Health Organization (WHO) map for “Children aged under-five stunted, 2000-2008” (World Health Organization, 2010) indicates that the countries where greater than 40% of their children experience nutrition-related growth-stunting are concentrated in Africa, South Asia and the South Pacific islands.

The 1996 World Food Summit defined food security as “a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious foods that meets their dietary needs and food preferences for a healthy life”⁵⁹. This definition

⁵⁹ Barrett CB, Measuring food insecurity, *Science*, 327, 825, 2010

⁶⁰ Michaelsen KF, Hoppe C, Roos N, Kaestel P, Stougaard, M, et al., Choice of foods and ingredients for moderately malnourished children 6 months to 5 years of age. *Food and Nutrition Bulletin*, 30, S343-S404, 2009

⁶¹ Benoist BD, Preventing and controlling micronutrient deficiencies in populations affected by an emergency. In: Organization, N.F.H.A.D.W.H. (ed.); www.WHO.int/nutrition/publications/micronutrients/WHO_WFP_UNICEFstatement.pdf. Geneva, Switzerland, World Health Organization

⁶² Stephenson LS, Lathan MC, Ottesen EA, Global malnutrition, *Parasitology*, 121, S5-S22, 2000

⁶³ Horton R, Maternal and child nutrition: an urgent opportunity, *The Lancet*, 371, 179, 2008

⁶⁴ Black RE, Allen LH, Bhutta ZA, Caulfield LE, et al., Maternal and child undernutrition: global and regional exposures and health consequences, *The Lancet*, 371, 243-260, 2008

incorporates several needs: availability of food, access to food, and for the food to be culturally appropriate. There are many factors in today's global environment that exacerbate food security. We live in an age where humans are producing more food than ever before. Some believe that there is enough food to feed the world's current population, but food is not distributed properly nor is all food culturally appropriate across the globe. Local food access differs dramatically and the greatest difference exists between developed and developing countries. The primary reason for this inequity is an income-related difference between these populations⁶⁵. It must be stated, however, that in every country of the world there is hunger, and this often falls along economic and social lines. The underprivileged—be it individuals or countries—often have less.

Food security relates directly to nutrition and health. Typically food security is thought of as being related to availability and access of foodstuffs. Yet, the threat to food security also lies with urbanization, income disparity, overpopulation, ecosystem degradation, animal health, and food wholesomeness. Food wholesomeness is also an important aspect of nutrition. Wholesomeness is monitored via food safety and food defense programs, making them critical components of a food security program as well. Inter-relations and concepts for future scientific and humanitarian development programs have been reviewed⁶⁶.

There are three areas of global concern that impact food security: overpopulation, climate change and urbanization. Areas of the world with the highest birth rates and population, where demand often exceeds supply, also have the greatest levels of hunger and disease. Local ecosystems provide the resources a population needs for food production, health, environmental management and water. Examples include rangeland, fertile soil, nutrient cycling, and wildlife for hunting, among others. The local ecosystem has a certain carrying capacity, and once this is exceeded the ecosystem becomes stressed and begins to

⁶⁵ Hazell P, Wood S, Drivers of change in global agriculture. *Phil. Trans. R. Soc. B*, 363, 495-515, 2008

⁶⁶ Havas K, Salman M, Food security: Its components and challenges, *Int J Food Safety, Nutrition and Public Health*, in press (2011)

break down. This is defined as ecosystem vulnerability⁶⁷. The results can include over-farmed soils, denuded grazing lands and dried up or contaminated wells, all of which contribute to an underfed population. All these areas can utilize veterinary profession input. U.S. veterinarians will need to think about not only their nation, but the global impact of meat, poultry and dairy protein.

Issues to Consider for Delivering Services to Food Producing Animals

- 1. How should veterinary students be trained to address global issues regarding food animals?**
 - a. Food accessibility, vulnerability, security, safety**
 - b. Zoonotic diseases**
 - c. Cultural preferences for food types**
 - d. Trade issues; supply/demand**
 - e. Bioterrorism**
 - f. Disease threats by geography**
 - g. Agricultural engineering/systems**
 - h. Minimizing impact of food producing animals on the environment**
- 2. What are the business opportunities for U.S. food animal production and non-U.S. food production?**
- 3. What are the risks for U.S. food animal production and non-U.S. food animal production?**
- 4. How can veterinarians be trained to increase production at the same time they increase animal comfort and welfare?**
- 5. What are the projections for sustained food animal production?**

⁶⁷ Ericksen PJ, What is the vulnerability of a food system to global environmental change? Ecology and Society, 13, 14, 2008

Other Species

As stated previously, it is difficult to predict the future services required for the world's animals. Specialties in veterinary medicine now include the following:

- American Board of Veterinary Practitioners
- American Board of Veterinary Toxicology
- American College of Laboratory Medicine
- American College of Poultry Veterinarians
- American College of Theriogenologists (specialists in reproduction)
- American College of Veterinary Behaviorists
- American College of Veterinary Clinical Pharmacology
- American College of Veterinary Dermatology
- American College of Veterinary Emergency and Critical Care
- American College of Veterinary Internal Medicine
 - Cardiology
 - Large Animal Internal Medicine
 - Neurology
 - Oncology
 - Small Animal Internal Medicine
- American College of Veterinary Microbiologists
- American College of Veterinary Nutrition
- American College of Veterinary Ophthalmologists
- American College of Veterinary Pathologists
 - Anatomic pathology
 - Clinical pathology
- American College of Veterinary Preventive Medicine
- American College of Veterinary Radiology
- American College of Veterinary Surgeons
- American College of Zoological Medicine
- American Veterinary Dental College

It is difficult to know how veterinary services might be required in the future for exotic pets, laboratory animals, wild birds, genetically-modified or cloned animals, endangered populations, animals with new diseases emerging from climate change, and more. Disciplines involving food safety, environmental toxins/endocrine disruptors, bioterrorism, animal transportation (ground, air, sea) and public health will certainly change.

At least 45 diseases have passed from animals to humans in the last two decades⁶⁸, with the number expected to escalate in the coming years. These have originated from both wild and domestic species⁶⁹. Examples include swine flu, avian flu, West Nile virus, Hantavirus, rabies and many others.

As animal genomes are defined and super-biological computers developed to analyze genetically-influenced aspects of health and disease, personalized drugs, diets and diagnostic tests will certainly be developed for various species, breeds and/or individuals.

A new specialty college, the **American College of Animal Welfare**, is now being proposed to train veterinarians about a multiple of existing and/or potential animal welfare issues. The organizing committee has met several times since 2007 to define the training program, examination and certification process. Veterinarians increasingly understand their role as advocates to both individual animals and to populations of animals on our planet. On January 1, 2011, a revised veterinary oath was announced⁷⁰ by the American Veterinary Medical Association, which now states that veterinarians will protect both animal health and welfare:

The newly revised section of the oath—the committee's additions appear in italics—reads as follows:
"Being admitted to the profession of veterinary medicine, I solemnly swear to use my scientific knowledge and skills for the benefit of society through the protection of animal health *and welfare*, the *prevention and* relief of animal suffering, the conservation of animal resources, the promotion of public health, and the advancement of medical knowledge."

Thus, as the societal needs and expectations change, veterinary profession will need to change as well.

⁶⁸ Jeremy Laurance, Deadly animal diseases poised to infect humans. Science News – The Independent, January 4, 2010

⁶⁹ World Health Organization, 1999;

⁷⁰ American Veterinary Medical Association press release, January 1, 2011

Other Issues to Consider for Veterinary Medicine
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1. Public relations and marketing the profession to the world (Universal Physicians)
 - a. Positive image could aid with student recruitment – similar to the Johnson & Johnson ads for recruiting nursing students
 - i. Student debt needs to be addressed
 - b. Public and private officials to recognize the wide breadth of skills that veterinarians possess (example: Nobel Prize Winner for Medicine, 2010 – for birth of Louise Joy Brown, first “test tube baby”. In-vitro fertilization was successful utilized by veterinarians several years before being successful in humans)
2. Incorporating animal welfare, ethics and business into a well-defined training program for veterinary fellows, postdoctoral students
3. Integration of relevant agriculture discipline in veterinary medicine in both education and research.

ACTION PLAN – First Steps

January 2012: Convene a Task Force to identify, and provide advice on priority issues for (1) assessing/addressing societal needs from the veterinary profession going forward, and (2) advancing business opportunities that address such societal needs to promote animal health/welfare

Task Force composition would depend on topic to address, with examples given below:

EDUCATION

Employers: Largest sectors of current employers
Federal/state governments
International
Corporate veterinary medicine
Industries (pharmaceutical, food)
Providers: Academe
Users: Consumers

FOOD PRODUCTION

Users: Corporations
Regulators: Governments/USAID/USDA
WHO/FAO/OIE/World Bank
WTO
Support: Academe
NGO: Environmental
Animal welfare

OTHERS TOPICS TO FOLLOW

White papers will be published from each working group. Consider beginning with either education and/or food animals (2012) with others to follow.

Note to readers: The authors of this paper have attempted to provide some of our thoughts for future discussion, debate and dialogue – wishing that the veterinary profession will continue to serve our world in an optimal manner. Additional input, expertise is welcomed and needed.