

Summary of Major Findings

Economic and Social Impacts of Veterinary Medicine in Ohio

A Study Commissioned by a Partnership Between
The Ohio State University College of Veterinary Medicine
and the Ohio Veterinary Medical Association

Bill LaFayette, Ph.D.
Owner, Regionomics® LLC

Stephen A. Buser, Ph.D.
Professor Emeritus, Fisher College of Business
The Ohio State University¹

July 11, 2017



THE OHIO STATE UNIVERSITY
FISHER COLLEGE OF BUSINESS



Summary of Major Findings

The purpose of this report is to assess the scope and impact of veterinary medicine in Ohio. Evaluations are based on findings for firms that operate in related industries, as well as findings from surveys of the veterinary and animal-related programs in Ohio educational institutions. We consider both economic impacts and the social impacts of veterinary medicine on Ohio residents. We also consider the impact of the cost of a veterinary degree and debt burden that it imposes on graduates.

Even if a narrow definition is applied, Veterinary Services account for more than 23,000 Ohio jobs, and those jobs generate more than \$800 million in wages for Ohio workers. In addition, the total contribution of Veterinary Services to the Ohio economy exceeds \$2.4 billion. If the industry definition is expanded to include supporting businesses and animal related businesses, the number of Ohio jobs grows to more than 93,000, total wages grow to nearly \$3.7 billion, and the total contribution to the Ohio economy grows to nearly \$13 billion.

These broader animal-related industries include animal production (farming) and related industries, animal food manufacturing, farm and pet supplies wholesalers and retailers, biotechnology research, racetracks, zoos, and non-veterinary pet care. The impacts also include those of The Ohio State University College of Veterinary Medicine, including the Veterinary Medical Center (VMC). The contributions include the direct output and employment of the industries themselves, as well as the necessary contributions of suppliers, which are referred to as indirect impacts. It also includes the impact of the household spending of direct and indirect workers. These workers earn wages and salaries from their employment, and as a result purchase household goods and services of all kinds.

Veterinary medicine contributes significantly to Ohio agriculture by ensuring the health and marketability of farm animals. Agriculture is the heart of a \$110 billion industry that is Ohio's largest. The state ranks 10th in the nation for the value of farm products. The impact of veterinary medicine on Ohio agriculture enters to some degree in the measured impacts. While this impact cannot be fully quantified, veterinary medicine makes a vital contribution to the overall Ohio economy.

Impacts of veterinary services, the College of Veterinary Medicine and the VMC, and the auxiliary animal care industries are shown in Table S-1 (page 2). These also include earnings impacts: the wages, salaries, and self-employment income earned through direct, indirect and induced activity.

93,000

Ohio Jobs Supported in 2015

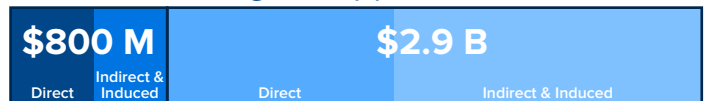


Veterinary Services

Supporting & Animal-related Industries

\$3.7 billion

Ohio Wages Supported in 2015

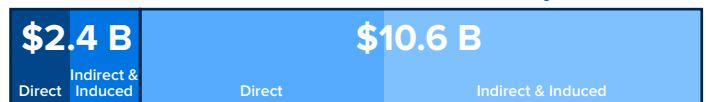


Veterinary Services

Supporting & Animal-related Industries

\$13 billion

Contribution to the Ohio Economy in 2015



Veterinary Services

Supporting & Animal-related Industries



Veterinary Medicine Helps Protect & Support Ohio's Agriculture Industry

¹The authors acknowledge the essential research assistance provided by Amy Buser, Ph.D. and the design and layout work provided by Tim Vojt.

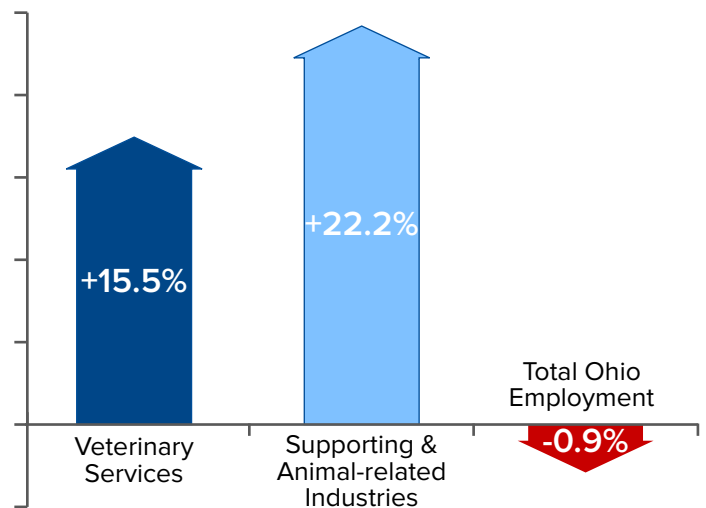
Table S-1: Summary Economic Impacts on the Ohio Economy of Veterinary and Animal-Related Industries and Ohio State Institutions, 2015

	Direct	Indirect	Induced	Total
Employment (jobs)				
Veterinary services	12,877	3,766	6,520	23,163
Ohio State (college and VMC)	673	92	403	1,167
Other industries	28,422	18,954	21,863	69,238
Total	41,972	22,812	28,785	93,569
Earnings (\$)				
Veterinary services	438,097,000	161,485,000	228,328,000	827,910,000
Ohio State (college and VMC)	33,118,000	3,900,000	14,067,000	51,084,000
Other industries	1,171,098,000	839,431,000	768,966,000	2,779,495,000
Total	1,642,313,000	1,004,816,000	1,011,361,000	3,658,489,000
Output (\$)				
Veterinary services	1,110,543,000	559,047,000	769,495,000	2,439,085,000
Ohio State (college and VMC)	71,008,000	11,739,000	47,511,000	130,258,000
Other industries	4,483,200,000	3,320,848,000	2,580,747,000	10,384,795,000
Total	5,664,751,000	3,891,634,000	3,397,753,000	12,954,138,000

Ohio veterinary services employment in 2015 was 15.5 percent higher than 2007 (immediately before the recession) and the veterinary auxiliary industries' employment was 22.2 percent higher. Total Ohio employment across all sectors as of 2015 was 0.9 percent lower than in 2007.

In contrast to total Ohio employment, which during the recession suffered a three-year decline totaling 7.5 percent, veterinary services and the auxiliary industries experienced small declines in only one year (2009). In neither case was this decline large enough to reduce employment below its pre-recession level. In the years following the end of the recession in 2010, employment in veterinary services gained 14 percent and the auxiliary industries gained 20.9 percent, but total Ohio employment gained only 7.1 percent. Thus, in a small way, these animal-related industries reduced the impact of the recession on Ohio employment and increased its growth in the expansion.

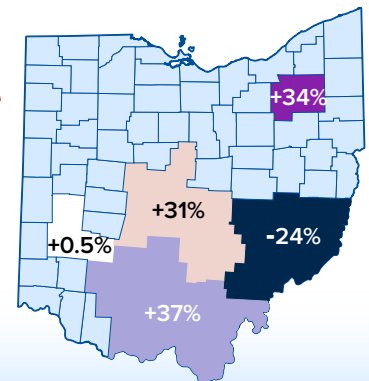
Change in Employment from 2007 to 2015



There are considerable differences in veterinary services employment growth among Ohio regions.

Southern Ohio enjoyed the strongest net growth between 2007 and 2015 with a gain of 37 percent, while the Akron Metropolitan Statistical Area (MSA) gained 34 percent and the Columbus MSA gained 31 percent. However, employment in the Dayton MSA increased only 0.5 percent and employment in Southeastern Ohio declined almost 24 percent.

Veterinary Service Job Growth in Ohio 2007-2015



There are approximately 3,300 veterinarians practicing in Ohio. While this number is relatively small, the corresponding economic impact of the veterinary industry in Ohio is remarkably strong.

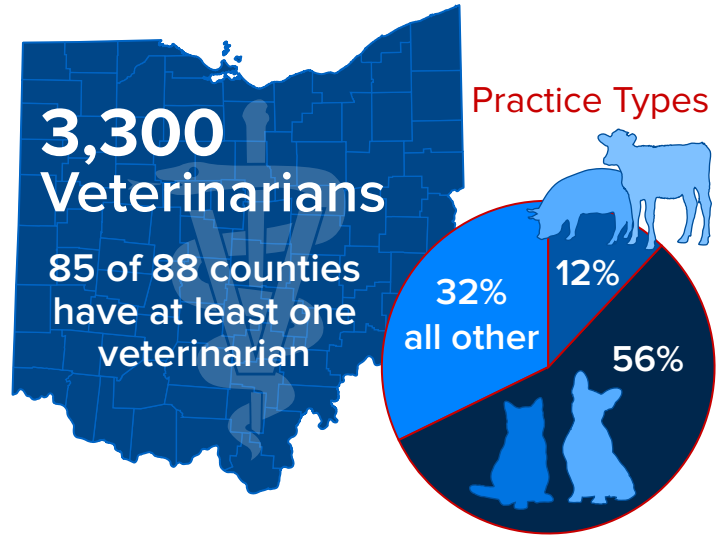
This total is an estimate by the Ohio Veterinary Medical Association, and includes both payroll employment and self-employed individuals. Many of these self-employed veterinarians are owners of their own practice. There is at least one veterinary office in 85 of Ohio's 88 counties. The majority of veterinarians in Ohio (56 percent) are in private practices focusing on companion animals and another 12 percent treat both pets and farm animals. Smaller numbers treat horses and farm animals exclusively, work in academics and research, or are employed by corporations or government.

Ohio educational institutions offer an array of veterinary and animal care programs beginning as early as high school and continuing through Ohio State's doctoral programs.

Of the 86 high school career and technical education centers throughout the state, 28 offer coursework in animal science or animal care, including five offering a specific program in equine science. At least 27 two-year and four-year colleges and universities in Ohio offer veterinary and animal-related programs and/or certificates, including 20 four-year pre-veterinary programs. Ohio State offers the state's only doctoral program in veterinary medicine, master's and doctoral degrees in comparative and veterinary medicine, and a master's program in veterinary public health.

Ohio State also accommodates a robust veterinary research program, some discoveries of which are commercializable, and one of the largest veterinary medical centers in the U.S.

Researchers in the college developed the first feline leukemia vaccine and have developed technology used in tick-borne disease diagnostics. Faculty are leaders in the development of advanced animal orthopedic procedures, infectious diseases, food safety, and cancer. The VMC is one of the largest veterinary medical centers in the U.S. and is the only comprehensive referral veterinary medical center for companion animals, farm animals, and horses in Ohio, Kentucky and West Virginia. The VMC admits more than 35,000 patients annually. Additionally, the college's Large Animal Services in Marysville, Ohio provides farm-based service to livestock operations across 17 counties.



The Ohio State University
College of Veterinary Medicine

- Robust Research
- Translational Medicine



Veterinary Medical Center

- One of the largest in the U.S.
- 42,000 patients annually
- Comprehensive referral for three states

Animals convey a wide variety of physical, behavioral, mental, psychological and social benefits. Among these are the therapeutic value of owning and caring for pets. Veterinarians play an important role in the study, prevention and containment of zoonotic diseases — infectious diseases that animals can transmit to humans and that humans and animals share.

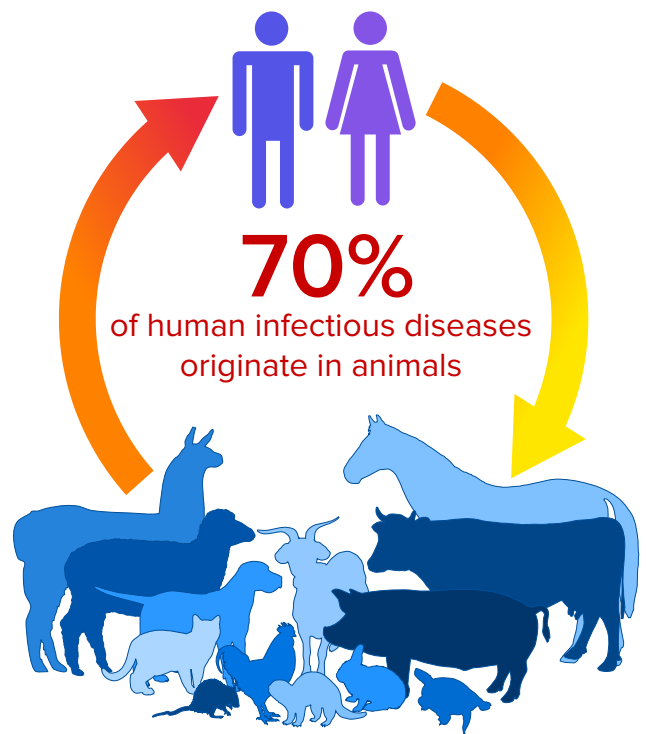
Pets make substantial contributions to the health and well-being of pet owners. Owning or interacting with pets or other animals has been found to lower blood pressure, alleviate depression, and improve many other health conditions. Interacting with animals has resulted in significant improvement in patients suffering from severe mental and emotional conditions, including schizophrenia, psychosis, autism, and post-traumatic stress syndrome (PTSD). These benefits reduce healthcare costs, lengthen life spans, and likely improve workforce participation and economic productivity. Companies that allow employees to bring their pets to work enjoy greater productivity perhaps because of the effect on decreasing stress and increasing workplace satisfaction among employees.

A number of diseases that can be transmitted from animals to humans have attracted worldwide attention because of the disruption, suffering, and death they have caused. This also has an immense economic impact because of the effect on travel, international trade, and healthcare costs. These include Ebola, avian influenza (bird flu), rabies, Lyme disease, West Nile disease, and Zika virus among others. Studying transmission and patterns of infection can help the medical profession understand, anticipate, and mitigate outbreaks of these diseases. Research has shown that approximately 70 percent of all human infectious diseases share this animal-to-human link and first originate in animals.

A wide variety of ailments are common to animals and humans. Veterinarians routinely observe and treat these conditions for a broad array of species. They have often developed methods for diagnosing and treating certain conditions applicable to animals and people. The ability to apply insights from veterinary studies and treatment protocols to treatment of humans can leverage the effectiveness and reduce the cost of medical research.



Pets make substantial contributions to the health and well-being of pet owners.



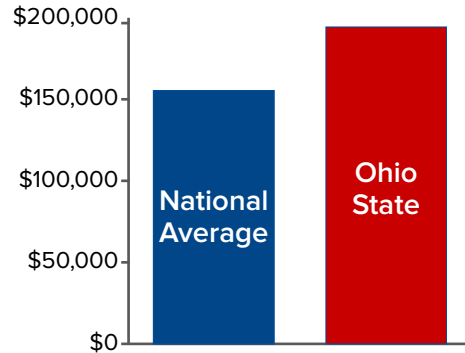
The high cost of a veterinary degree and the substantial debt burden that obtaining a degree entails is likely deterring some individuals from entering this field. The Ohio State veterinary students generally graduate with higher debt than do graduates of other veterinary programs. This is a result of the comparatively low level of state support for the veterinary medical program at Ohio State.

The total in-state tuition for a four-year veterinary degree at Ohio State is currently \$140,017, not including books, supplies, lab fees, room, and board. An annual survey by the American Veterinary Medical Association (AVMA) of veterinary program graduates found that students graduating in 2016 had an average debt burden of \$155,291, more than double the inflation-adjusted 2001 level. The average debt burden of Ohio State graduates was \$194,363, which is 25 percent greater than the national average. There is a risk that the high cost of a veterinary education and the need to assume a significant amount of debt will discourage interested students from entering the field.

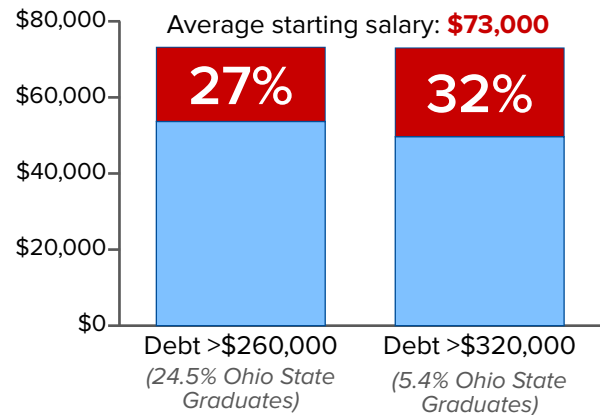
The AVMA finds that the prospects of future earnings are generally sufficient to cover the tuition costs for advanced degrees in veterinary medicine, but the extent of such coverage appears to have narrowed substantially in recent years. If public financial support continues to decline and tuition continues to increase, the relationship of future earnings to initial debt levels could turn negative. Regardless of the positive long-term prospects, however, debt service payments can impose a significant burden on individuals beginning their career. The American Veterinary Medical Association reports a \$73,000 average starting salary for recent graduates going into practice. The 24.5 percent of Ohio State students graduating with at least \$260,000 in debt can face annual payments of \$19,530 or more – at least 27 percent of their before-tax income if income based loan repayment programs are not employed or discontinued at a federal level. The 5.4 percent of graduates with \$320,000 or more in debt would make payments amounting to 32 percent or more of their income.

The high tuition of the Ohio State veterinary program and the high debt levels of its graduates are a direct result of low levels of state support. Ohio’s support amounts to ~\$19,500 per student, less than half the \$44,000 average for the top 10 veterinary programs nationwide. Increases in state support is needed to attenuate increases in tuition and maintain a supply of qualified program candidates.

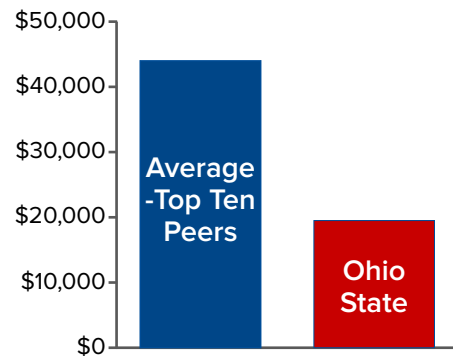
Ohio State 2016 graduates average debt is **25% higher** than the national average.



Percent of average starting salary represented by loan repayment liability.



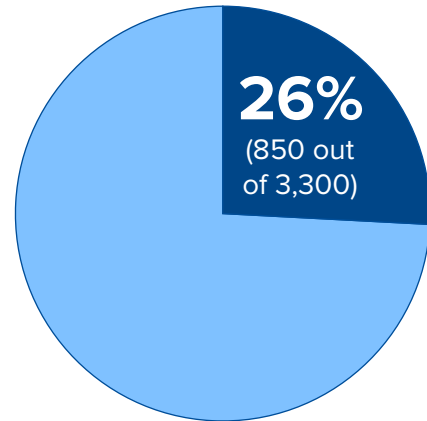
State support per student at Ohio State is **less than half** the average of its top ten peer institutions.



Nationwide, 26 percent of veterinarians are 55 years or older and 7 percent are 65 or older.

If the same percentages apply to Ohio veterinarians, 850 of the 3,300 veterinarians are at least 55 years of age. Virtually all of these are likely to retire within the next 15 to 20 years. If the Ohio distribution were available, however, it might show an even larger share in older age groups because the Ohio population is older than the U.S. average. The Ohio State College of Veterinary Medicine has an important role in ensuring that the supply of new veterinarians is sufficient to fill this emerging gap, and to supply future needs.

850 Ohio veterinarians are expected to retire in the next 15 to 20 years



Conclusion

Veterinary medicine is a vital industry in Ohio, contributing billions of dollars to the state's economy and supporting thousands of jobs. Its impact is widespread, ranging from companion animal clinical practice to animal agriculture, research, biotechnology and much more.

From the veterinary students and faculty at the College of Veterinary Medicine at The Ohio State University to the practitioners taking care of Ohio's pets, horses and farm animals, to veterinarians employed in industry, research and government, the fabric of veterinary medicine supports and serves communities throughout Ohio. The veterinary profession and the college contribute broadly across many disciplines to create a healthier world for animals and people.

This study reaffirms what intuitively has been known by many – that veterinary medicine protects the health of Ohio animals, supports the health of people and contributes significantly to a healthy Ohio economy.

To access the full report, please visit go.osu.edu/cvmesifull on the College of Veterinary Medicine website or visit ohiovma.org/study on the website of the Ohio Veterinary Medical Association.

Bibliography

- Ascione, F., & Weber, C. (1996). Children's attitudes about the humane treatment of animals and empathy: One year follow up of a school-based intervention. *Anthrozoos*, 9 (4), 188-195.
- Brody, J. E. Owing a pet can have therapeutic value. *New York Times*, August 11, 1982.
- Carlsen, K., et al. (2012). Does pet ownership in infancy lead to asthma or allergy at school age? Pooled Analysis of Individual Participant Data from 11 European Birth Cohorts. *PLOS One*, 7(8): 1-12
- Centers for Disease Control (2016a). Rabies. <https://www.cdc.gov/rabies/index.html>.
- Centers for Disease Control (2016b). West Nile virus. <https://www.cdc.gov/westnile/>
- Centers for Disease Control (2017). Lyme disease. <https://www.cdc.gov/lyme/index.html>.
- Charnetski C. J., Riggers S. (2004). Effect of petting a dog on immune system function. *Psychological Reports* 95:1087- 1091. 19
- Church J., Williams H. (2001). Another sniffer dog for the clinic?. *Lancet* 358 (9285): 930–930. doi:10.1016/S0140-6736(01)06065-2.PMID 11575380.
- Clower, T. L., Neaves, T. T. (2015). *The health care cost savings of pet ownership*. Report prepared for the Human Animal Bond Research Initiative Foundation.
- Dharmage, S., et al. (2012). Exposure to cats: Update on risks for sensitization and allergic diseases. *Current Allergy and Asthma Report*, 12(5): 413-423 .
- Ehmann R., Boedeker E., Friedrich U, et al. (August 2011). Canine scent detection in the diagnosis of lung cancer: Revisiting a puzzling phenomenon. *European Respiratory Journal*, 39 (3): 669–76. doi:10.1183/09031936.00051711. PMID 21852337.
- Fine, A. H. (2000). *Animal-assisted therapy: Theoretical foundations and guidelines for practice*. San Diego, CA: Academic Press.
- Freidman, E., Katcher, A., Lynch, J. and Thomas, S.(1980). "Animal companions and one-year survival of patients after discharge from a coronary care unit." *Public Health Report*, 95(4): 307-312.
- Gammonley, J., Howie, A. R., Jackson, B., et al., (2000). *Animal-assisted therapy: Therapeutic interventions*. Renton, WA: Delta Society.
- Heady, B. and Grabka, M. (2007). Pets and human health in Germany and Australia: National longitudinal results. *Social Indicators Research*, 80(2): 297-311.
- Irani, S., Mahler C., GoetGern, J., et al. (2004). Effects of dog ownership and genotype on immune development and atopy in infancy. *Journal of Clinical Immunology*. 113(2):307-314.
- Johnson CC, Peterson EL (2002) Exposure to dogs and cats in the first year of life and risk of allergic sensitization at 6 to 7 years of age. *Journal of the American Medical Association*, 2002; 288: 96372.
- Lakdawalla, P. (2003). Sea-ing results: An Aquarium can Help Boost Alzheimer's Patients' Appetites. *Contemporary Long Term Care*, 26(7): 28.

- Levine G. N., Allen K., Braun L. T., et al., (2013). Pet Ownership and cardiovascular risk: A scientific statement from the American Heart Association. *Circulation*, 127(23): 2353-2363.
- Levinson, B. M. (1962). The dog as a co-therapist. *Mental Hygiene*, 46, 59-65.
- Levinson, B. M. (1969). *Pet oriented child psychotherapy*. Springfield, IL: Charles C. Thomas.
- Lodge, C. J., Allen, K. J., Lowe, A. J., et al. (2012). Perinatal cat and dog exposure and the risk of asthma and allergy in the urban environment: a systematic review of longitudinal studies. *Clinical and Developmental Immunology*, 2012(2012): 1-10.
- McCulloch M., Jezierski T., Broffman M, et al. (2006). Diagnostic accuracy of canine scent detection in early- and late-stage lung and breast cancers. *Integrative Cancer Therapies* 5 (1): 30-39
- Michel J. B., Shen Y. K., Aiden A. P., et al. (2011). Quantitative analysis of culture using millions of digitized books. *Science*, 331(6014):176-182
- Nafsted P., Magnus P., Gaader P. I., Jaakola J. J. K. (2002). Exposure to pets and atopy-related diseases in the first 4 years of life. *Allergy*, 56: 30712.
- Rupp, J. A. (2017). Ebola virus. *World Book Advanced*.
- Siegel, J. (1990). Stressful life events and the use of physician services among the elderly: "The Moderating Effects of Pet Ownership." *Journal of Personality and Social Psychology*, 58(6): 1081–1086.
- Verrier L (March 1970). Dog licks man. *Lancet* 1 (7647): 615. doi:10.1016/S0140-6736(70)91650-8.PMID 4190562.
- Wegienka, G., Johnson, C. C., Havstad, S., et al. (2011). Lifetime dog and cat exposure and dog- and cat-specific sensitization at age 18 years. *Clinical and Experimental Allergy*, 41(7): 979-986.
- Williams H., Pembroke A. (1989). Sniffer dogs in the melanoma clinic?. *Lancet* 1 (8640): 734. doi:10.1016/S0140-6736(89)92257-5.PMID 2564551.
- Willis C. M., Church S.M., Guest C. M., et al. (2004). Olfactory detection of human bladder cancer by dogs: proof of principle study. *BMJ* 329(7468)
- World Health Organization (2016). Avian and other zoonotic influenza fact sheet.
www.who.int/mediacentre/factsheets/avian_influenza/en/