

The Economic Impact of Veterinary Medicine on the State of Missouri

A Report from the
University of Missouri College of Veterinary Medicine
and the Missouri Veterinary Medical Association

Prepared by the
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CONTENTS

Executive Summary	Page 2
Private Practice in Missouri	Page 5
Academic Veterinary Medicine	Page 11
Industrial Veterinary Medicine	Page 15
Conclusions	Page 20
Methodology	Page 22
Bibliography	Page 29

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The Economic Impact of Veterinary Medicine on the State of Missouri

Executive Summary

The veterinary medical profession is dynamic and complex, encompassing professionals working in such varied fields as life sciences research, diagnostic services, the government and military, and private practice. Veterinarians also serve important roles in the enhancement of food safety and public health, regulation of animal export and trade, and enrichment of the human-animal bond. Today, veterinarians are a key group protecting U.S. citizens from bio-terror attacks.

Veterinary medicine touches everyone in the state. The most familiar contact is the neighborhood veterinarian. In 1999, millions of Missouri residents benefited from the physical, psychological, and emotional well being that accompanies companion animal ownership. By preserving the health and longevity of companion animals, veterinarians sustain and enhance these aspects of the human-animal bond.



Missouri has a population of approximately five million, and more than half of the state's households own one or more pets.

Human health and well being are improved as a result.

Veterinary medicine is also a respected partner in the state's livestock, equine, and food animal industries. The economic well being of Missouri's agri-businesses is enhanced by

the health and productivity of its animals. Improvements in these areas carry substantial economic benefits. Progressive animal health management provides a crucial method of managing risk in animal industries. Through research, regulation, and quality assurance programs in livestock production, veterinary medicine enhances the safety and quality of our food. Risks of drug residues or microbiological contaminations are thereby reduced.

Scientists in veterinary medicine are currently studying life and disease processes in their most basic forms, creating a natural collaboration with researchers in human medicine. This effort has spawned a new term: The One Medicine Concept. Already, Missouri veterinary researchers and their human medicine colleagues have started the process of identifying and treating a number of diseases that threaten both humans and animals.

In addition to these benefits, veterinary medicine has a tangible economic impact on Missouri. This impact is often poorly rec-



Missouri's equine industry is a substantial part of the state's agri-business. The state's approximately 140,000 horses support a host of companies supplying feed, tack, buildings, and other services and products. About one-third of Missouri veterinarians practice some sort of large animal medicine.

The Economic Impact of Veterinary Medicine on the State of Missouri



Companion animals have become members of our families--and we expect a high level of medical care for them. Many animal owners want virtually the same quality of care as they expect for themselves.

ognized and easily misunderstood as few studies have been conducted to systematically evaluate the broad monetary impact of the veterinary profession. One objective of this project was to document the economic importance of veterinary medicine to the state of Missouri.

In summary (detailed results follow), economic activity of almost \$251,000,000 occurred during 1999 as a direct result of expenditures by veterinary medicine on salaries, supplies, and services within Missouri. This economic impact radiates through the state's economy for more than \$615,600,000 in direct and indirect impact. In addition, a total of almost 10,000 Missouri jobs (professional and lay positions) resulted from veterinary medicine in 1999.

Veterinary medicine offers much to society. Studies such as this help to highlight and improve the visibility of the profession's many invaluable contributions to the quality of human life.

Private Practice

in Missouri

Missouri has a population of approximately five million, and more than half of its households own one or more pets. These pets have become valued members of our family. When divorce, economic challenges, or other family problems threaten us, we often turn to a loving dog or cat that offers unconditional love. Mental health experts say that owning a companion animal is one way for people to better cope with a faster paced, more frazzled world.

Also, there is a growing body of scientific evidence that people who commune with animals experience positive physical and mental health effects. Among other things, petting a cat can help reduce a person's blood pressure, people who own dogs improve faster after heart surgery, and elderly people who own animals require fewer doctor visits and medications.

These initial studies on the benefits of animal ownership have spawned research programs that soon may add to a physician's ability to treat medical

The University of Missouri College of Veterinary Medicine has graduated more than 2,600 veterinarians since its founding in 1946. Most practice in the state of Missouri.

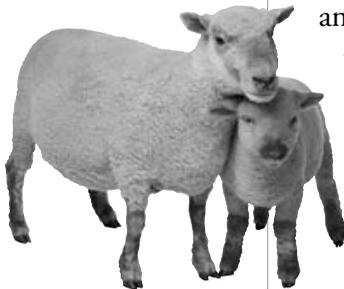


The Economic Impact of Veterinary Medicine on the State of Missouri

Missouri is a mostly rural state with a substantial part of its population relying on agriculture. The state's livestock and related products amount to a more than \$2.5 billion annual industry for the state.

There are about two million head of cattle in the state.

Agriculture is the second largest industry in Missouri.



problems without expensive pharmaceuticals or surgical intervention. Veterinarians have expanded their traditional role into this new area of medicine, enhancing human as well as animal life.

Private practice veterinarians also partner with the state's agri-businesses to manage the health of herds, prevent diseases, increase livestock productivity, and make the food supply safe for consumers.

Missouri's farm animals include cattle (Missouri is second only to Texas as a cattle producing state), hogs, sheep, chickens, turkeys, and others. Their products help feed the world, ranging from milk and eggs to poultry, beef, and pork. All told, Missouri livestock and related products contribute more than \$2.5 billion annually to the state's economy. Many of the state's Fortune 500 companies are tied to livestock production.

Private practice veterinarians also partner with the state's equine industry. In 1999, according to the USDA, horse sales totalled more than \$24 million (a figure that does not include feed, tack, and related items like trucks and buildings). There are about 140,000 horses in the state.

Private practice veterinarians have a dramatic monetary impact on the state of Missouri. Missouri's 721 private practices employed more than 4,300 individuals (about 2,300 veterinarians) in 1999. These practitioners spent a

total of \$193.6 million in Missouri on their operations, including over \$40 million on veterinarian salaries and \$56 million on staff salaries.

In addition, the owners of private practices earned more than \$17.5 million in residual profits from their work. These firms spent almost \$10 million for insurance, about \$5.5 million on communication (such as advertising, computer, and phone service), \$43.3 million on other miscellaneous services, about \$21 million on various manufactured products, and almost \$17 million in payments to vendors.

Economists know that a dollar's worth of business has an impact greater than just that dollar. A dollar spent at a grocery store by a veterinarian on bread is used by the store to pay other vendors who, in turn, pay their employees. Economists call the multiple impact of a dollar a "multiplier."

In this study, a basic Keynesian multiplier approach is used to estimate the effect of expenditures made in the veterinary medicine sector on wages, salaries, and other expenditures on total spending and employment in Missouri. The approach (see page 22)



Veterinarians love their profession despite economic obstacles.

On average, student debt upon graduation hovers around \$65,000 nationwide, while starting salaries are about \$40,000 per year.

The Economic Impact of Veterinary Medicine on the State of Missouri

The human-animal bond is more than a warm and fuzzy feeling that you get while interacting with an animal. Recent scientific studies have shown that relating with animals can lower blood pressure and enhance good body chemicals that can reduce stress, enhance the immune system, and decrease the chance of contracting disease. These discoveries may lead to new treatments for a number of diseases without the expense and side effects of drugs.

recognizes that one person's expenditure becomes another's income. That second person spends a portion of that income on the goods or services produced by a third person and so on. At the end of the process, that original spending generates total spending that is a multiple of the original (hence the name "multiplier").



The total impact of expenditures made by private veterinary practice in Missouri during 1999 is detailed in Table 1A with current multipliers that are accepted by economists. For example, it is known that a dollar spent in salaries will generate an economic effect of 2.4168 times its value in an economy.

With the multipliers included, the total effect of private veterinary practice spending contributed nearly a half billion dollars to the Missouri economy in 1999.

Table 1A

Private Practice Output Effects

<i>Expense Type</i>	<i>Expense</i>	<i>Multiplier</i>	<i>Gross Impact</i>
Veterinarian Salaries	\$40,059,706	2.4168	\$96,816,298
Ancillary Staff Salaries	\$56,031,843	2.4168	\$135,417,758

Owner Profits	\$17,528,00	2.4168	\$42,361,688
Insurance	\$9,614,282	2.5138	\$24,168,383
Communication	\$5,518,730	1.9294	\$10,647,837
Misc. Services	\$43,357,742	2.2219	\$96,336,567
Misc. Manufacturing	\$21,466,114	2.1999	\$47,223,303
Payments to Vendors	\$16,896,129	1.9326	\$32,653,459
Totals	\$193,576,424		\$485,625,294

The expenditures of private practice veterinarians, as in any industry, help create jobs. Statistically, it is known that almost 50 jobs are created for every one million dollars of salary, for example. Table 1B shows the expenditures made by private practitioners supported an estimated 7,890 jobs in Missouri, of which about 4,586 come directly or indirectly from salary payments to veterinarians and their staffs.

About half of Missouri's veterinarians exclusively treat companion animals. Almost all are small business owners with strong ties to their communities.

Table 1B

Private Practice Employment Effects

<i>Expense Type</i>	<i>Expense</i>	<i>Multiplier</i>
Job Impact		
Veterinarian Salaries	\$40,059,706	47.7224
1,912		



The Economic Impact of Veterinary Medicine on the State of Missouri

There are approximately
30,000 to 50,000 horse
owners in Missouri.



Ancillary Staff Salaries	\$56,031,843	47.7224	2,674
Owner Profits	\$17,528,007	47.722	4836
Insurance	\$9,614,282	26.3126	253
Communication	\$5,518,730	13.6791	75
Miscellaneous Services	\$43,357,742	30.3089	1,314
Misc. Manufacturing	\$21,466,114	23.7972	511
Payments to Vendors	\$16,896,129	18.6141	315
Totals	\$193,576,424		7,890

Academic Veterinary

Medicine

The value of a scientific discovery made through university research can be incalculable. It is difficult to put a value on a person or animal whose disease is cured because of a new treatment or technique.

This has become even more important as Missouri has embarked on an effort to become a center of life science research in the nation. Veterinary medicine is a full partner in this effort as modern science has demonstrated that virtually all basic biomedical scientific discoveries have long term applications for both human and animal health.



This approach is known as the “One Medicine Concept” whereby veterinary scientists collaborate with their counterparts in human medicine to seek cures for diseases that afflict both animals and humans—cancer, for instance. Already, Missouri—which boasts colleges of medicine, nursing, engineering, veterinary medicine, agriculture, a cardiovascular research center, and a nuclear

The University of Missouri’s College of Veterinary Medicine is one of only just 27 such colleges in the U.S. It is among the few that exist on a campus that has a Research University 1 ranking from the Carnegie Foundation for the Advancement of Teaching.

Last year, College’s Veterinary Medical Teaching Hospital treated more than 17,000 animals. Its food animal clinic is one of the busiest in the nation.

The Economic Impact of Veterinary Medicine on the State of Missouri



Researchers at the MU College of Veterinary Medicine are looking at ways to reduce cardiovascular disease, help astronauts survive a flight to Mars, and develop new techniques to relieve animal suffering. This year, the College has garnered almost \$8 million in research grants from such organizations as the National Institutes of Health, National Science Foundation, USDA, EPA, and others.

reactor on one campus—has seen joint efforts in a number of clinical disciplines. One tangible product from such joint efforts was the development of new radio-pharmaceuticals to relieve the pain of certain bone cancers.

Veterinary researchers are not just helping companion animals. Experts in food animal production are partnering with industry to make the state more competitive. One such initiative, the Show-Me Select program, has helped Missouri cattle producers identify desirable production traits and increase the producer's most important product—their bottom line.

Another part of Missouri's academic veterinary mission is familiar to everyone—the classroom. Here, the next generation of veterinarians are trained in the latest techniques and equipment—and the age-old prescription of compassion and service. Most Missouri-educated veterinarians stay in the state, starting small businesses, joining established ones, or entering the military or government service.

Missouri's only College of Veterinary Medicine, at the University of Missouri in Columbia, is one of 27 such institutions in America. It has three missions: to teach the next generation of

veterinarians the latest techniques and skills, provide sophisticated primary and referral/diagnostic medicine through its Veterinary Medical Teaching Hospital and Veterinary Medical Diagnostic Laboratory, and host researchers delving into new ways to prevent and heal disease.

While the value of such education, service, and research may, ultimately, be incalculable, the value of expenditures and total output impacts of academic veterinary medicine can be measured. Faculty and staff salaries and benefits in 1999 totaled approximately \$21.8 million (of which about 40 percent comes from the state and the remainder from sources such as the Veterinary Medical Teaching Hospital). Related expenditures totaled an estimated \$10.1 million.

These figures, of course, have their multipliers, too. As table 2A shows, academic salaries in Missouri result in a total financial impact of almost \$75 million.



The MU College of Veterinary Medicine faculty includes more than 100 full-time professors and 20 adjunct professors.



The MU Veterinary Medical Diagnostic Laboratory is one of only 31 accredited by the American Association of Veterinary Diagnostic Laboratories. It offers diagnostic assistance to veterinary practitioners and animal owners to diagnose diseases that threaten the state's livestock and companion animals. Last year, the laboratory performed more than 175,000 tests on samples that came from all 114 Missouri counties.

Table 2A
Missouri Academic Sector Output Effects

<i>Expense Type</i>	<i>Expense</i>	<i>Multiplier</i>	<i>Job Impact</i>
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The Economic Impact of Veterinary Medicine on the State of Missouri

Faculty/Staff			
Salaries & Benefits	\$21,791,515	2.4018	\$52,338,861
Misc. Expenses	\$10,148,058	2.1999	\$22,324,714
Totals	\$31,939,574		\$74,663,575

Table 2B shows that the expenditures made by the Missouri veterinary academic sector generated an estimated 1,019 jobs in the state.

Table 2B
Missouri Academic Sector Employment Effects

<i>Expense Type</i>	<i>Expense</i>	<i>Multiplier</i>	<i>Job Impact</i>
Faculty/Staff			
Salaries & Benefits	\$21,791,515	35.7028	778
Misc. Expenses	\$10,148,058	23.792	241
Totals	\$31,939,574		1,019

The mission of the University of Missouri-Columbia College of Veterinary Medicine is to provide excellent veterinary medical education while providing diagnostic and therapeutic services for the animal owning public. Research excellence is an integral part of evaluating the current knowledge being taught and expanding the biomedical knowledge of the future.

Industrial



Medicine

Missouri is home to a number of animal nutrition and pharmaceutical companies. Veterinarians play a crucial role in ensuring the safety, quality, and marketability of these products.

Missouri veterinary medical-related industrial firms spent an estimated \$20.4 million on veterinarian salaries in 1999 (as shown in table 3A) that directly or indirectly led to approximately \$45.4 million in spending on Missouri goods and services.



About 30 percent of Missouri veterinarians are salaried employees of government agencies, universities, or corporations. In these positions, they are involved in regulatory activities, diagnostic services, research, product development, sales, marketing, or teaching. Many assume administrative roles.

Table 3A

Missouri Industrial Sector Output Effects

<i>Expense Type</i>	<i>Expense</i>	<i>Multiplier</i>	<i>Gross Impact</i>
Veterinarian			
Salaries	\$20,419,829	2.2219	\$45,370,817
Totals	\$20,419,829		\$45,370,817

Table 3B shows that the expenditures made by the industrial division of veterinary medicine supported approximately 619 jobs in the state.

The Economic Impact of Veterinary Medicine on the State of Missouri

Drug and pharmaceutical manufacturers, feed and pet food producers, and corporate farms and feed-lots use veterinarians in research and development, management consultation, herd-health programming, product complaint disposition, technical services, sales, and promotional activities and in management and executive capacities. In these organizations, the training and experience offered by veterinarians often provides specialized approaches and unique dimensions to the corporate structure.



Table 3B

Missouri Industrial Sector Employment Effects

<i>Expense Type</i>	<i>Expense</i>	<i>Multiplier</i>	<i>Job Impact</i>
Veterinarian Salaries	\$20,419,829	30.3089	619
Totals	\$20,419,829		619

Governmental Veterinary

Medicine

As in the academic area, it is difficult to assess the total impact of veterinarians involved in government service (such as the military and in state regulation of food safety and quality). Veterinarians who identify and manage disease outbreaks before they become epidemic may be responsible for saving millions—if not more—dollars to the state’s economy.

Missouri is a major agricultural state and the veterinary medical profession plays a critical role in food safety. Critical is the operative word here as loss of consumer confidence in particular products can cause dramatic shifts in purchasing habits. Major disruption of meat and dairy sales, as occurred in Great Britain’s outbreak of bovine spongiform encephalopathy (Mad Cow Disease), can have enormous impact on a region’s economical health and export trade, not to mention litigation and loss of life. Veterinarians—private practitioners on farms, inspectors for governmental agencies, diagnosticians, clinicians, and researchers—are involved at every stage of food safety.

Veterinarians also serve as business advisors, helping with herd health management or to minimize risk of organisms developing resistance to antibiotics. Moreover, veterinarians have joined



In municipal, state, and federal governments, veterinarians are employed mostly in health and agricultural agencies. They are involved in research, food inspection programs, animal disease control and eradication programs, and in the quality supervision of vaccines and serum used in animals.

The Economic Impact of Veterinary Medicine on the State of Missouri



Livestock production accounts for 57 percent of the state's agricultural receipts, with the remaining 43 percent derived from a wide range of crops, according to the Missouri Farm Bureau.

the fight against terrorism, watching over the nation's food supply for evidence of tampering.

In terms of dollars that can be measured, veterinarians employed by government in Missouri received approximately \$2.3 million in salaries. The government sector spent about \$754,600 on manufactured goods and an additional \$1.8 million on services. This resulted in a direct total impact of almost \$5 million (see table 4A). Overall, with their appropriate multipliers, spending on output produced by Missouri governmental veterinarians generated approximately \$10 million.

Table 4A

Missouri Government Sector Output Effects

<i>Expense Type</i>	<i>Expense</i>	<i>Multiplier</i>	<i>Gross Impact</i>
Veterinarian Salaries	\$2,319,069	1.8896	\$4,382,112
Misc. Services	\$1,758,711	2.2219	\$3,907,679
Misc. Manufacturing	\$754,398	2.1999	\$1,659,600
Totals	\$4,832,177		\$9,949,391

Table 4B shows the expenditures made by the government portion of the veterinary medicine sector in Missouri supported approximately 109 jobs.

Table 4B

Missouri Government Sector Employment Effects

<i>Expense Type</i>	<i>Expense</i>	<i>Multiplier</i>	<i>Job Impact</i>
Veterinarian Salaries	\$2,319,069	16.3530	38
Misc. Services	\$1,758,711	30.3089	53
Misc. Manufacturing	\$754,398	23.7972	18
Totals	\$4,832,177		109

Conclusions

It is a testament to the professionalism of veterinary medicine that Missourians can bite into a hamburger or pork chop without fear, or take a sick animal to the neighborhood private practice with assurance that the best quality of clinical care will be available. And, while these professionals provide direct service to

Missouri produces \$228,000 worth of wool each year.

A dairy cow gives 65 glasses of milk each day. Missouri ranks eighth in cheese production, eighth in milk cow production, and eleventh in ice cream production.

Chickens in Missouri produce 1.72 billion eggs each year. Missouri ranks fourteenth in national egg production.



The Economic Impact of Veterinary Medicine on the State of Missouri

Interaction with animals has been shown to increase children's physiological health, social competence, and learning opportunities.

citizens, others labor behind the scenes to create the next generation of (veterinary and human) medical techniques or products to make the lives of Missourians easier.

Veterinarians also make critical contributions to society in agri-business, regulation of live animal export and trade, public health, educating the next generation of veterinarians, and the enrichment of the human-animal bond.



This study affirms the diversity and breath of the veterinary profession.

Expenditures made by individuals, firms, and other organizations involving veterinary medicine have a multiplier effect on the overall economy. When a veterinarian receives his/her salary, he/she will spend some of that income on other goods and services.

This report estimates the amount of economic activity in the state of Missouri directly attributable to the practice of veterinary medicine is more than \$250 million. Indirectly, spending by firms producing goods and services in the veterinary medicine sector of the Missouri economy generated \$615.6 million in spending on goods and services produced by Missouri firms. This

spending also supported approximately 9,638 jobs in the state. The public often overlooks these indirect contributions of veterinary medicine, yet they are no less important.

Table 5

Aggregate Output and Employment Effects

Total Expenditures	
\$250,768,003	
Impact on Output	\$615,609,076
Impact on Employment (Jobs)	9,638



The average market value of agriculture products sold per farm was \$54,297 in 1997, according to the Missouri Farm Bureau.

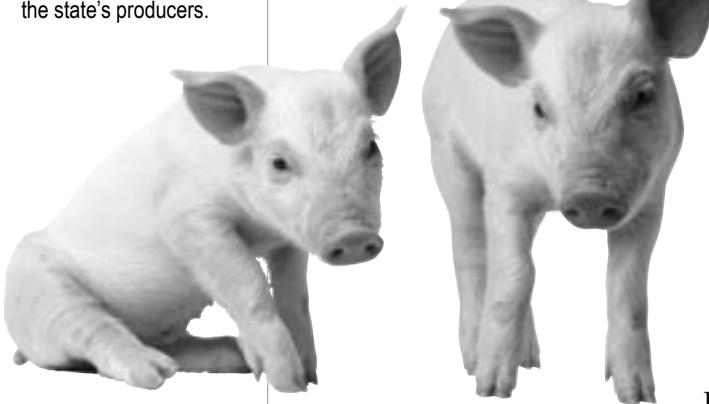
Methodology

In a perfect world, an impact study on an economic sector broadly asks “what would the economy be like if that sector did not exist?” The researchers would compare an economy with and without that sector to estimate its effect on various economic indicators (such as the spending on goods and services, worker incomes, and jobs). This suggests the existence of a control—for example, a separate economy that does not have the sector in question or an economy that did not have the sector in question during a specific time period.

When one considers veterinary medicine, however, there is no re-

The Economic Impact of Veterinary Medicine on the State of Missouri

Veterinary medicine, through herd health management consultation and medical care, is directly responsible for increasing the efficiency of the state's food animal production. Every one percent productivity increase in the state's \$2.5 billion livestock industry results in an increase of \$25 million more sales for the state's producers.



liable control. First, all states have at least three of the four broad divisions of veterinary medicine examined here: private practice, industry, and government. Only 27 states have an academic sector, and, for those states that do, the academic sector is a relatively small proportion of the veterinary medicine sector and an even smaller proportion of an entire economy. Moreover, comparing states that have an academic sector to those that do not would not answer the broad question of the economic impact of veterinary medicine.

Second, it is not possible to compare the Missouri economy during periods when the veterinary medicine sector did and did not exist. Hence, it is not possible with our present methodology and data to study the question “what would the Missouri economy

be like in the absence of veterinary medicine?” Instead, we ask the question “How much economic activity in the state of Missouri during a particular calendar year can be attributed to veterinary medicine?”

This study employs a basic Keynesian multiplier approach to estimate the effect of ex-

penditures made in the veterinary medicine sector on wages and salaries and other expenditures on total spending and employment in Missouri. The basic Keynesian multiplier approach, named after John Maynard Keynes, the Cambridge economist credited with first developing this concept of the multiplier, recognizes that one person's expenditure becomes another's income. That second person spends a portion of that income on the goods or services produced by a third person and so on. At the end of the process, that original spending generates total spending that is a multiple of the original (hence the name "multiplier").



Also used are Regional Input-Output Modeling System (RIMSII) multipliers available from the United States Bureau of Economic Analysis (BEA) for various BEA regions. The BEA region used in this study is the state of Missouri. Both output and employment multipliers are detailed in this study. The RIMSII output multiplier for a given industry in a region estimates the total amount of spending generated within that region when someone spends \$1 on the good or service produced. This total effect includes the "direct effect"—the original dollar spent—and the "indirect effect"—the additional spending that is generated. For example, the multiplier for Veterinary Services in Missouri is 2.4168. This multiplier implies that

There were 44,751 full-time farms and a total of 98,860 farms in 1997 in Missouri. The average value of an acre of farmland in Missouri is \$1,069.

The Economic Impact of Veterinary Medicine on the State of Missouri

\$1 spent on veterinary services in Missouri (such as the examination of a family pet) generates approximately \$2.42 of total spending on goods and services produced by Missouri businesses:

\$1 of direct spending and \$1.42 of indirect, or additional, spending.



RIMSII employment multipliers represent the total number of jobs generated for each \$1 million spent on goods and/or services provided by a particular industry within a BEA region.

In terms of data acquisition, as noted above,

veterinary medicine in Missouri's economy is divided into four basic divisions: private practice, academia, industry, and government. Calendar year 1999 data were used in this report. Some data sources provided data for calendar year 1999, some provided data for fiscal years, and some provided data for years other than 1999. Because consistent data for calendar year 1999 could not be obtained, estimates were made using the available data in some cases.

Modern veterinary medicine uses most of the same procedures, pharmaceuticals, and equipment as human medicine. As in human medicine, many veterinarians specialize in specific areas such as oncology, orthopedics, and ophthalmology.

Salary, benefit, and other expenditure data on the Missouri academic division were obtained from the College of Veterinary Medicine of the University of Missouri for fiscal years 1998 (July 1st, 1997 to June 30th, 1998) and 2000 (Miller, 2002). Estimated calendar year 1999 expenditures were made by taking the average of the fiscal year 1997 and 1999 expenditures.

For the other three divisions of the veterinary medicine sector, data on the employment of veterinarians were obtained from the 1999 Veterinary Demographic Data Report produced by the American Veterinary Medical Association (AVMA). This resource provides the number of veterinarians by primary employment category (private practice, industry, etc.) by state. The 1999 report is the last report available and it contains employment data for 1980, 1990, and 1998. To estimate the number of veterinarians employed in each category in 1999, the growth rate of employment in each category was calculated from 1990 to 1998 (G). It was then assumed that the growth rate in each category between 1998 and 1999 (g) is equal to the average annual growth rate between 1990 and 1998 (eight years): $g = G/8$. This was used to calculate the number of veterinarians employed in each category in 1999 (emp99) as the number employed in



each category in 1998 (emp98) times one plus the average annual growth rate for each category: $emp99 = (1+g)(emp98)$.

The average income of veterinarians by primary employment category for calendar year 1999, by region, was obtained from the 2001 Economic Report on Veterinarians and Veterinary

Recent scientific studies indicate that people who own companion animals live longer than those who do not.

The Economic Impact of Veterinary Medicine on the State of Missouri

Animal abandonment continues to be a major problem facing veterinary medicine. According to the American Humane Society, 18 million animals—about 15 percent of the country's 43 million dogs and 75 million cats—end up each year in shelters. Most are euthanized. Nine thousand animals were humanely destroyed in St. Louis County alone last year with about that same number in Kansas City.



Practices published by the AVMA. The data for the Midwest region was used for this study.

Non-veterinarian salary expenditures, owners' profits, and non-wage and salary expenditures for private practitioners were obtained from the 2001 Economic Report on Veterinarians and Veterinary Practices, as well. The number of private practitioners in Missouri in calendar year 1999 was obtained from the U.S. Census website. Note: the preparers of this study were unable to collect data on fringe benefits paid to employees of private practitioners.

Non-wage and salary expenditure data for the Missouri government were obtained from the Missouri Division of Animal Health (Matthews, 2002). Data for federal government veterinary-medicine-related expenditures in Missouri were provided by Dr. Robert Fisher of the United States Department of Agriculture in Jefferson City, Missouri (Fisher, 2002). Both sets of government data for fiscal years 1999 and 2000 were used and respective averages were the basis for the estimate for calendar year 1999 expenditures for each governmental level.

No non-wage and salary expenditure information from the Missouri industrial division was obtained. This is not troubling because most of these expenditures are very small and contribute very little to the Missouri economy as a whole. Yet keep in mind



that the estimates for the industrial division may understate the actual contribution of this division.

The preparers of this report assume that all expenditures made by all sectors are made on goods and services produced in Missouri, with one exception. In conversations with private practice veterinarians, it was determined that private practitioners acquired most of the pharmaceuticals and most pet food from out-of-state manufacturers. However, the private practitioners acquired these goods through in-state vendors. To capture this effect, the preparers assumed that 20% of private practice expenditures on pharmaceuticals and pet food goes to Missouri vendors. The remaining 80% goes to the out-of-state manufacturers of those goods.

Finally, researchers at the BEA estimated the output and employment multipliers used in this study using 1997 regional data. Consequently, using the Consumer Price Index (CPI) for all

Missouri is home to a number of major veterinary-related businesses. VSSI of St. Joseph is a leading manufacturer of veterinary industry stainless steel products and cabinetry. Phoenix Scientific, which manufactures generic pharmaceuticals for the animal health industry, recently completed construction of a \$35 million facility nearby. Nestlé Purina PetCare Company is a global maker of pet care and food products and is a major employer in St. Louis. Boehringer Ingelheim Vetmedica, AgriLabs, and Bayer Pharmaceutical manufacture animal health products in the Kansas City area, as does Addison Biological Laboratory in Fayette.

The Economic Impact of Veterinary Medicine on the State of Missouri

urban consumers, we adjusted all of our data to reflect the purchasing power of a dollar in 1997. The preparers obtained the CPI data from the databases of the Economic and Policy Analysis Research Center.

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