

# ON THE MONEY

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## The Impact of Veterinary and Animal Care Services in Ohio

Regionomics recently completed a comprehensive exploration of veterinary and animal care services in Ohio. The study was commissioned by The Ohio State University (OSU) College of Veterinary Medicine and the Ohio Veterinary Medical Association, and undertaken in collaboration with Stephen A. Buser, Professor Emeritus and former Chair of the OSU Finance Department. This is an important industry that merits a discussion here. The primary findings of the study are shared with the clients' permission.

The findings are as follows:

- Veterinary and animal care firms are present in a number of industries, and individuals in these occupations work in a number of additional industries as well.
- The quantifiable impacts on the Ohio economy in terms of output, earnings, and jobs are substantial. Veterinary medical services (including the OSU Veterinary Medical Center) are responsible for \$2.5 billion in Ohio output; \$0.8 billion in wages, salaries, and self-employment income; and roughly 23,500 jobs. Including other animal care industries and the OSU College of Veterinary Medicine brings the impact to \$13 billion in output, \$3.7 billion in earnings, and 161,800 jobs.
- Additional impacts on the well-being of Ohioans are much more difficult to quantify but are no less important. Veterinary and animal care industries are an important contributor to Ohio's crucial \$110 billion agricultural industry in promoting the health of livestock and the safety of the food supply.
- Veterinary scientists undertake research that promotes the health of both animals and humans. Pets promote the social, psychological, and physical health of their owners in a variety of ways. Approximately 70 percent of infectious diseases start in animals and spread to humans, so it is vital to understand these mechanisms. Further, humans and animals are subject to a number of common diseases. Innovations in veterinary research can and do have applicability in medical research.
- The high cost of a veterinary degree may be a deterrent to those who are concerned about taking on a large amount of debt early in their career. Total tuition for a veterinary degree is \$140,000, not including books, fees, and living essentials. The typical graduate of the OSU veterinary program emerges with \$213,000 in debt, which results in debt service of nearly one-quarter the typical graduate's starting salary. State support for the program amounts to \$19,500 per student, less than half the level of support of the top 10 programs.

### Veterinary and Animal Care Employment in Ohio

Table 1 shows employment in relevant veterinary and animal care industries, employment changes since the 2007 pre-recession employment peak, and the concentration of each

industry's employment in Ohio's economy. Concentration is shown by the location quotient, which is the percentage of total Ohio employment in an industry divided by the percentage of U.S. employment in that industry. Thus, a location quotient greater than one implies a concentration greater than average.

**Table 1**  
**Ohio Employment in Veterinary and Animal-Related Industries**

NAICS code and industry	Ohio employ- ment, 2015	Change, 2007-2015		Location quotient
		Ohio	U.S.	
112 Animal production and aquaculture	5,808	43.8%	14.3%	0.606
115210 Support activities for animal production	960	27.8%	3.3%	0.877
311111 Dog and cat food manufacturing	1,106	-10.1%	25.3%	1.252
311119 Other animal food manufacturing	1,745	9.7%	3.7%	1.418
424910 Farm supplies merchant wholesalers	3,460	7.5%	5.3%	0.797
453910 Pet and pet supplies stores	4,404	-4.3%	16.0%	1.024
541711 Research & development in biotechnology	3,617	34.2%	16.9%	0.606
541940 Veterinary services	12,877	15.5%	17.7%	0.997
711212 Racetracks	1,063	-34.2%	-26.8%	0.859
712130 Zoos and botanical gardens	2,674	70.9%	25.1%	1.850
812910 Pet care, except veterinary, services	3,585	84.4%	78.7%	0.993
<b>Total veterinary and animal-related industries</b>	<b>41,299</b>	<b>20.1%</b>	<b>16.2%</b>	<b>0.886</b>

**Source:** Quarterly Census of Employment and Wages, U.S. Bureau of Labor Statistics.

The heart of the animal care sector is veterinary services, which is classified among professional, scientific, and technical services. Veterinary services employed 12,900 in 2015, or 31 percent of the 41,300 employed across the animal care sector. There are 1,073 veterinary establishments statewide, with at least one office in 85 of Ohio's 88 counties. Together, the firms in all the industries in Table 1 paid total wages of \$1.6 billion in 2015.

However, please note that this listing does not include all the activities of firms and organizations involved in animal care. Other activities cannot be included because they cannot be separated from the much larger industries of which they are a part. Examples include:

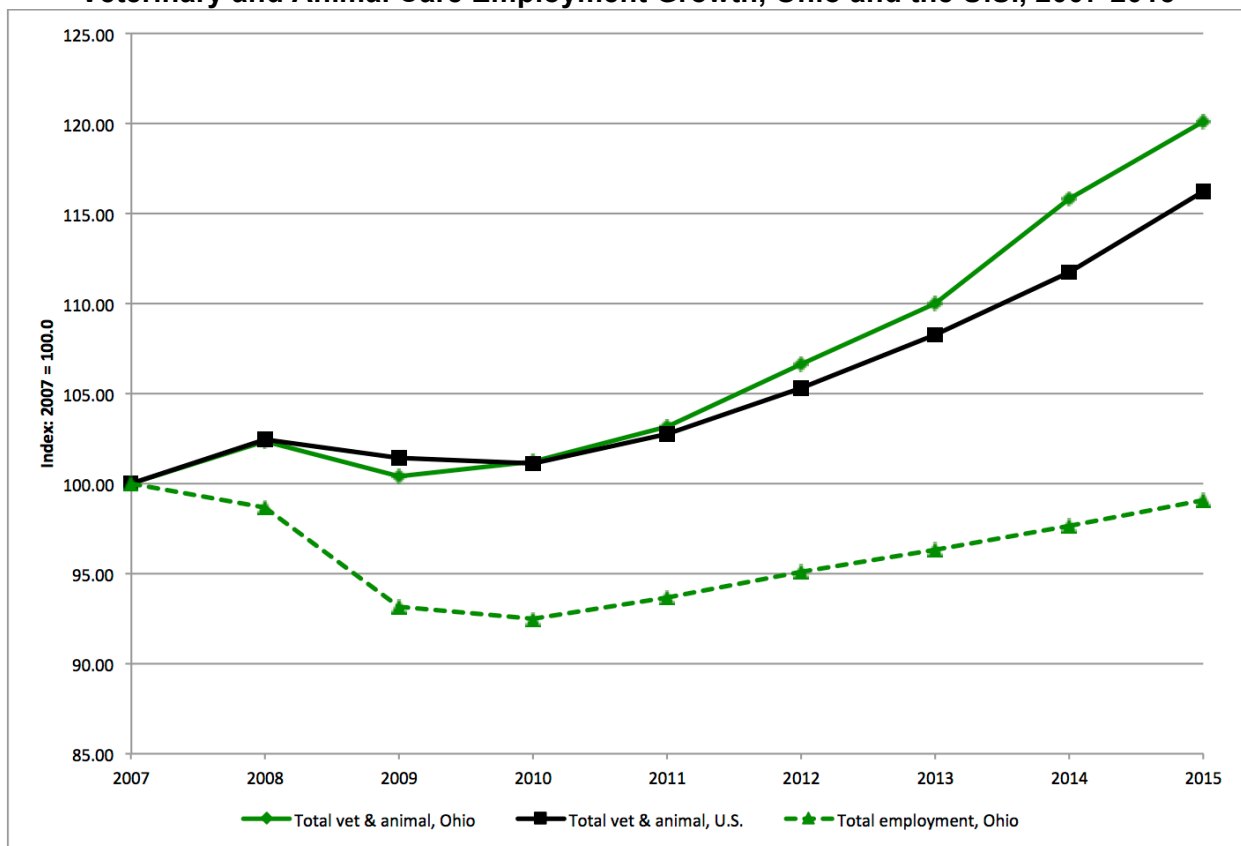
- Veterinarians' instrument manufacturing, part of surgical and medical instrument manufacturing;
- Veterinary instrument and equipment wholesale, part of other professional equipment merchant wholesalers;
- Animal medicine manufacturing and wholesale, part of pharmaceutical and medicine manufacturing and druggists' goods merchant wholesalers, respectively;
- Transportation of livestock, part of general or specialized freight trucking;
- Pet food and supplies sold in supermarkets and discount stores;
- The Ohio Agricultural Council and meat and livestock development and marketing associations, part of an industry including all professional organizations;
- The animal-related work of the Ohio Department of Agriculture and state boards and commissions, part of state government; and
- Local government animal shelters and animal control, part of local government.

The above-average growth of the animal care sector is primarily driven by the large employment gains in animal production and support activities, biotechnology research and development, and zoos and botanical gardens. In contrast, racetracks are suffering significant employment losses both in Ohio and elsewhere. Dog and cat food manufacturing lost employment in Ohio while gaining employment nationally. However, as emphasized in previous editions of *On the Money* (most recently October 9, 2015 – Vol. 131, No. 19) manufacturing employment is not a reliable

indicator of the health of the industry. As manufacturers continue to substitute automation for labor, production can increase even as employment declines. The statistics that would indicate whether this is true in this case are not yet available.

Figure 1 compares the cumulative growth in animal care employment to the national average and to total Ohio employment since 2007. In contrast to the three-year, 7.5 percent decline in total Ohio employment, veterinary and animal care industries were barely touched by the recession. The only decline in Ohio animal care employment was a modest 679-job (1.9 percent) loss in 2009 that maintained total employment above its pre-recession level. As is visible in the graph, Ohio employment growth has exceeded U.S. growth ever since. Ohio's employment gain between 2009 and 2015 totaled 6,766 jobs (19.6 percent) compared to a 14.6 percent U.S. gain.

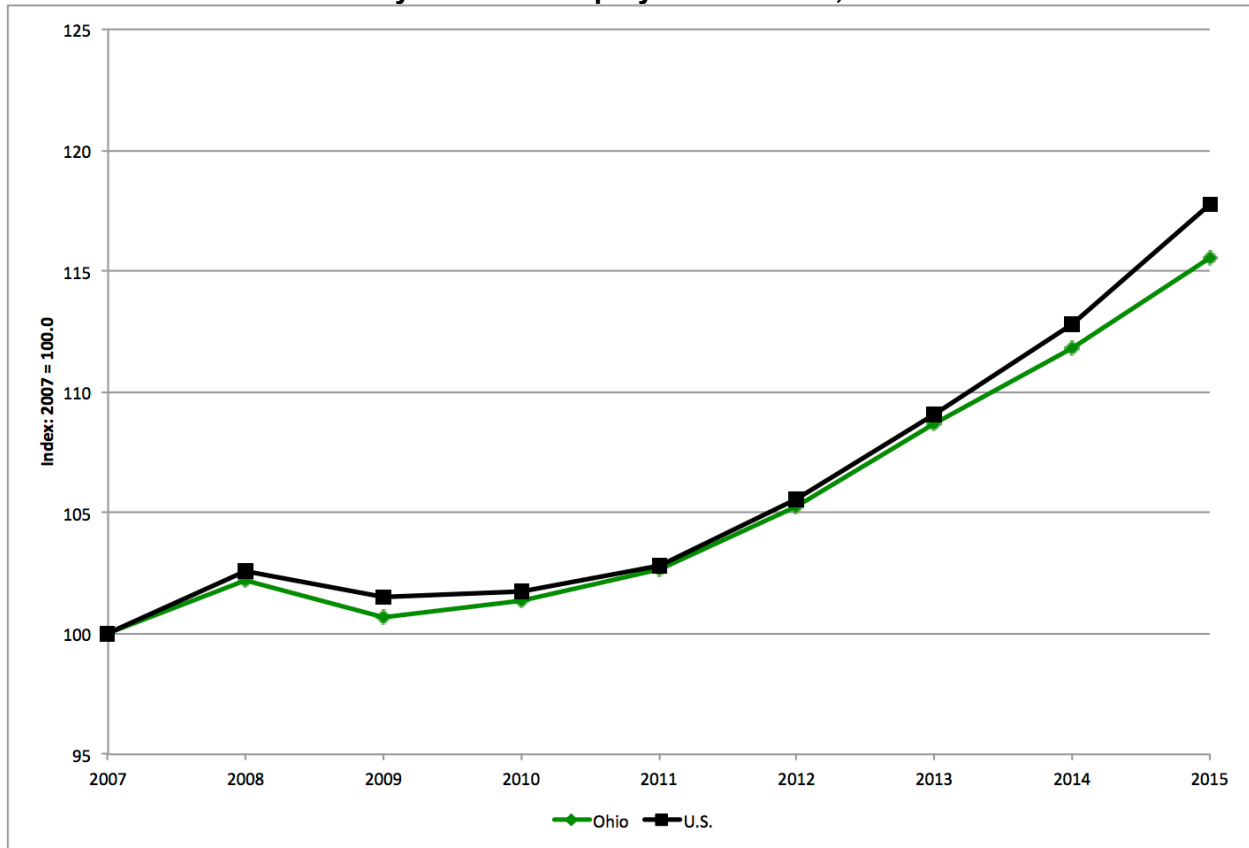
**Figure 1**  
**Veterinary and Animal Care Employment Growth, Ohio and the U.S., 2007-2015**



Source: Quarterly Census of Employment and Wages, U.S. Bureau of Labor Statistics.

As shown in Figure 2 on the next page, veterinary services employment growth tracked the national average fairly closely until 2014. because a significant percentage of veterinary services establishments function in a primarily local market, one might expect the industry's growth to mirror the very slow growth of Ohio population and households. Consequently, it could be argued that the fact that the growth of veterinary services employment is only slightly less than the national average is a sign of strength for the industry in Ohio.

**Figure 2**  
**Veterinary Services Employment Growth, 2007-2015**



Source: Quarterly Census of Employment and Wages, U.S. Bureau of Labor Statistics.

### Ohio Farm Animal and Pet Populations

The U.S. Department of Agriculture’s Agricultural Census is conducted every five years and provides counts of farm animals. Statewide totals from the past three agricultural censuses are shown in Table 2 on the next page. The number of cattle has declined slightly over the past decade as the number of hogs and broiler chickens has increased.

The number of pets of Ohio households can be estimated based on national statistics and the total number of households nationwide and in Ohio. These estimates are shown in Table 3, also on the next page. However, pet ownership rates are likely to vary based on demographics, income, and the rate of homeownership (many landlords prohibit pets). Thus, the estimates in Table 3 should be regarded as approximate.

**Table 2**  
**Farm Animal Population, Ohio Totals, 2002-2012**

Breed	Total			Change	
	2002	2007	2012	2002-2012	2007-2012
Cattle excluding cows	718,151	706,707	696,487	-3.0%	-1.4%
Cows	522,461	565,695	545,806	4.5%	-3.5%
Goats	45,061	69,505	51,558	14.4%	-25.8%
Hogs	1,422,966	1,831,084	2,058,503	44.7%	12.4%
Sheep and lambs	149,936	123,161	111,972	-25.3%	-9.1%
Chickens: broilers	5,878,909	10,021,948	12,194,024	107.4%	21.7%
Chickens: layers	30,759,965	27,070,109	28,312,692	-8.0%	4.6%
Geese	4,409	4,215	2,757	-37.5%	-34.6%
Roosters	n/a	n/a	43,609	n/a	n/a
Turkeys	1,873,917	2,074,750	2,096,395	11.9%	1.0%
Equine	134,368	119,198	114,127	-15.1%	-4.3%

n/a = Not available.

Source: Agricultural Census, U.S. Department of Agriculture.

**Table 3**  
**Companion Animal Ownership and Population, U.S. and Ohio, 2012**  
Totals in Thousands

Animal	United States			Ohio	
	Total/owning households	Average number per household	Animal population	Total/owning households	Animal population
Total hhlds.	115,970			4,555	
Dogs	43,346	1.61	69,926	1,702	2,746
Cats	36,117	2.05	74,059	1,418	2,909
Birds	3,671	2.26	8,300	144	326
Horses	1,780	2.73	4,856	70	191
Fish	7,738	7.46	57,750	304	2,268
Ferrets	334	2.24	748	13	29
Rabbits	1,408	2.28	3,210	55	126
Hamsters	877	1.31	1,146	34	45
Guinea pigs	847	1.61	1,362	33	53
Gerbils	234	2.00	468	9	18
Other rodents	391	2.22	868	15	34
Turtles	1,320	1.74	2,297	52	90
Snakes	555	2.07	1,150	22	45
Lizards	726	1.54	1,119	29	44
Other reptiles	365	2.01	732	14	29
Poultry	1,020	12.34	12,591	40	495
Livestock	661	7.63	5,045	26	198
All others	246	3.65	898	10	35
<b>Totals</b>	---	---	<b>246,525</b>	---	<b>9,682</b>

Source: U.S. Pet Ownership Statistics, American Veterinary Medical Association; American Community Survey, One-Year Estimates, 2012, U.S. Census Bureau.

### Veterinary and Animal Care Education in Ohio

The training of veterinarians and animal care workers begins as early as high school. Of the 86 career and technical education centers identified on the Ohio Higher Education website, 28 offer programs in animal science or animal care, including five offering a specific program in equine

science. Two other centers offer at least one animal science course as part of a larger agricultural career program.

At least 27 two-year and four-year colleges and universities in Ohio offer veterinary and animal-related degrees and/or certificates, including 20 four-year pre-veterinary programs. OSU, through the College of Veterinary Medicine, offers the state's only doctoral program in veterinary medicine. This and other colleges at OSU offer a variety of other undergraduate and graduate animal-related programs as well.

The OSU College of Veterinary Medicine is one of only 30 veterinary colleges in the U.S., and one of the oldest, largest, and most-respected, ranking fifth among all North American veterinary schools by *U.S. News and World Report*. Its doctoral program has graduated more than 9,100 veterinarians who practice in all 50 states and 40 countries, and account for approximately 80 percent of the practicing veterinarians in Ohio.

The OSU Veterinary Medical Center is one of the largest veterinary hospitals in the country and is the only comprehensive referral veterinary hospital for companion animals, farm animals and horses in Ohio, Kentucky and West Virginia. It admits more than 35,000 patients annually. Other OSU-affiliated animal treatment and research facilities include the Galbreath Equine Trauma, Intensive Care and Research Center, the Large Animal Services Facility in Marysville, and the Alice Lloyd Finley Memorial Veterinary Research Farm in Madison County, which serves as a teaching and research facility.

### **Economic Impacts of Veterinary and Animal-Related Industries in Ohio**

The firms in the veterinary and animal care industries generate output, wages and salaries, and employment. These are referred to as direct impacts. Those firms purchase supplies, inventory, and services in order to conduct business. As a result, those supplier firms generate output and increase their own purchases of supplies, and may hire additional workers. These supplier activities are referred to as indirect impacts. Further, direct and indirect business owners earn profits and their employees earn salaries, wages, and tips. These owners and workers use their earnings to purchase household goods of all kinds. These household purchases generate induced impacts. To the extent that these indirect and induced purchases are made within Ohio, the region's economic activity and output is increased beyond the increase due to the direct impacts.

It may seem counterintuitive to attribute output, earnings, and jobs impacts to industries far outside veterinary and animal care. But the point is that if the animal care services did not occur, there would be no demand for supplies and no wages supporting household purchases. Thus, the direct activities *cause* the indirect and induced activities. For this reason, the indirect and induced impacts are as much a part of the total economic impact as are the direct impacts. This is the point that makes economic impact analysis legitimate.

Indirect and induced impacts can be estimated by applying an economic impact model to the direct impacts. The model, developed by Regionomics, uses Regional Input-Output Modeling System (RIMS II) multipliers from the United States Bureau of Economic Analysis.

Results of the economic impact analysis are shown in Table 4. Even though the Veterinary Medical Center is in the veterinary services industry, adding its impacts to those of the industry does not lead to double-counting because the industry totals only count earnings and employment in the private sector. Because the Veterinary Medical Center is a component of

OSU, its employment is in the public sector. According to the results, firms in the veterinary services industry, along with their suppliers and employees of the firms and their suppliers, created in 2015 \$2.4 billion in output in Ohio, \$828 million in wages, salaries and self-employment income, and sustained more than 23,000 jobs in Ohio. The Medical Center and College of Veterinary Medicine together contributed an additional \$130 million in output and more than \$62 million in earnings, and sustained nearly 1,200 jobs.

**Table 4**  
**Summary Economic Impacts on the Ohio Economy of Veterinary and**  
**Animal-Related Industries and OSU Institutions, 2015**

	<b>Direct</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>
<b>Output (thousands)</b>				
Veterinary services	1,110,543	559,047	769,495	2,439,085
Veterinary Medical Center	24,096	6,140	15,523	45,759
College of Veterinary Medicine	46,912	5,599	31,988	84,498
Other animal care industries	4,483,200	3,320,848	2,580,747	10,384,795
<b>Total</b>	<b>5,664,751</b>	<b>3,891,634</b>	<b>3,397,753</b>	<b>12,954,138</b>
<b>Earnings (thousands)</b>				
Veterinary services	438,097	161,485	228,328	827,910
Veterinary Medical Center	10,133	1,962	4,597	16,692
College of Veterinary Medicine	22,985	1,937	9,471	34,392
Other animal care industries	1,171,098	839,431	768,966	2,779,495
<b>Total</b>	<b>1,642,313</b>	<b>1,004,816</b>	<b>1,011,361</b>	<b>3,658,489</b>
<b>Employment</b>				
Veterinary services	12,877	3,766	6,520	23,163
Veterinary Medical Center	223	41	132	395
College of Veterinary Medicine	450	51	271	772
Other animal care industries	56,844	37,907	43,051	137,802
<b>Total</b>	<b>70,167</b>	<b>41,755</b>	<b>49,834</b>	<b>161,756</b>

### Social Impacts of Veterinary Medicine

Psychological benefits of owning pets were noted as early as 1881, but the first modern discussion was published in a 1962 article in the *Mental Hygiene Journal*, “The Dog as a Co-Therapist.” This paper sparked further analysis, confirming that pet ownership does have a significantly positive impact on human health, social interaction, recovery from illness and depression, and the ability of elderly and severely disabled individuals to function. This phenomenon is called “zooeyia.” In one test of the theory, OSU researchers provided therapy dogs to two psychiatric patients. One of these was psychotic and uncommunicative. The other suffered from catatonic schizophrenia, was frozen and nearly mute, and had failed to respond to a variety of conventional therapies. After receiving their dogs, both patients responded quickly, their condition rapidly improved, and they were quickly discharged. The National Institutes of Health reports that dogs are now routinely used for therapeutic purposes. It has been found that people’s brains release endorphins when they see a dog, giving rise to these health benefits. Not surprisingly, dog owners who take their pets for daily walks have lower blood pressure, better cardiovascular health, and better social integration. Other studies have found similar positive impacts arising from other types of pets.

Although it would be difficult to measure, the zooeyia phenomenon does have positive economic consequences. To the extent that health outcomes are improved with pet ownership,

medical spending is reduced, personal independence is enhanced, and workforce participation is improved through fewer sick days and possibly larger numbers in the workforce. To the extent that the latter point is correct, productivity of these individuals – and thus that of their employers – is enhanced. Because the veterinary services industry is concerned with improving the health and longevity of pets, at least some of the economic impacts of these benefit can be attributed to that industry.

An important benefit of veterinary research is that veterinarians treat many of the same illnesses and emotional conditions in animals that are also present in humans, and it is even known that dinosaurs may have suffered from conditions such as gout, arthritis, and brain cancer. Indeed, there may be some veterinary treatment protocols that are not yet part of medical knowledge. The work of veterinarians and veterinary researchers may thus inform that of the medical profession. This alignment of animal and human diseases and methods of their treatment is called zoonosis, a term for comparative medicine. The ability to apply insights from veterinary studies and treatment protocols to treatment of humans can leverage the effectiveness of medical research.

A related point is that some infectious diseases begin in animals and migrate to humans. This phenomenon is called zoonosis. Examples are Lyme disease, various forms of influenza, Zika, and tuberculosis. Studies of zoonosis can detect, contain, and prevent transmission of infectious diseases to humans. Approximately 70% of emerging and re-emerging infectious diseases start in animals and spread to people. Thus, veterinary medicine is inextricably linked to human health.

### **Impacts of Veterinary College Tuition on Students and Graduates**

The four-year Doctor of Veterinary Medicine (DVM) program at OSU costs a total of \$140,017 for in-state students, not including books, supplies, lab fees, room, and board. This leads to substantial levels of student debt. The American Veterinary Medical Association (AVMA) 2016 Survey of Graduating Veterinary Students found that of students nationwide, the median amount of debt (i.e., the debt of the typical student) was \$160,000. For OSU graduates, the median was \$213,000.

Under current federal student loan terms, this \$213,000 debt results in a loan payment of \$1,284 per month or \$15,407 per year. This can place a substantial burden on a young veterinarian starting his or her career. The same AVMA survey reported that the median starting salary of Ohio graduates was \$65,000. Thus, monthly debt payments consume nearly one-quarter of the typical veterinarian's before-tax starting salary.

These loan payments also represent a leakage from the Ohio economy. Because these are loans made by the U.S. government, debt service payments are sent to Washington, DC. As discussed earlier, expenditures made outside the state provide no indirect or induced benefits to the Ohio economy. Consequently, as debt obligations increase, the economic impacts of veterinary medicine – and the tax revenues resulting from these activities – decline.

The tuition of the OSU veterinary program and the high debt levels of graduates are a direct result of low levels of state support. Ohio's support for this program is \$19,500 per student versus \$44,000 for the top 10 programs. Increases in state support would lead to reduced tuition as the Veterinary Medical College is better able to cover its expenses. This would result in



increases both in economic activity in Ohio and in income and sales taxes flowing to state and local governments.

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