THE IMPACT OF **VETERINARY MEDICINE** IN MICHIGAN

MICHIGAN STATE
UNIVERSITY
College of Veterinary Medicine

SUMMARY OF THE IMPACT OF VETERINARY MEDICINE IN THE STATE OF MICHIGAN

- Veterinary services generate approximately $827 million in sales and salaries
- The total economic impact of veterinarians in the state is estimated to be in excess of $1.447 billion
- In some respects, these figures underestimate the true economic impact because of the important role veterinarians play in supporting the agri-food system and their role in promoting the quality of life of pets and pet owners
- Veterinarians also do much to protect public health by treating and testing both livestock and wildlife for diseases
  - This aids in the prevention of the spread of zoonotic diseases from animals to humans
- Through their work with companion animals, veterinarians also do a great deal to enhance the quality of life for pets and their owners
- A change in regulations, potential disease outbreaks, and an increase in farm animals will increase the demand for veterinarians in the future

The presence of animals in Michigan is felt in homes and across the state.

- Pets

VETERINARIANS ARE PRIMARILY EMPLOYED IN THREE GENERAL AREAS:

- Private practice and private industry
- Education and research
- Government
  - Regulatory activities to ensure the health and safety of people

ECONOMIC IMPACT OF VETERINARY MEDICINE: **$1.447 BILLION**

- Direct impact of veterinary services: approximately $827 million
- Indirect and induced impacts: $620 million

EMPLOYMENT IN VETERINARY SERVICES WAS APPROXIMATELY 9,300

- Approximately 2,400 veterinarians in the state, based on the membership of the Michigan Veterinary Medical Association
- The total employment impact of veterinary services is estimated to be 12,600; related occupations in the industry include veterinary technicians, lab workers, and research assistants

ANIMAL AGRICULTURE INDUSTRY

- Employment: 9,600 people were employed in these industries in 2013
- Animal agricultural products: farm sales were $4.088 billion
  - 13,600 farms raised cattle (both beef and dairy)
  - 2,200 farms raised hogs
  - 2,300 farms with sheep and lambs
  - 12,400 farms with horses
  - 6,700 farms with layers
  - 1,150 farms with bee colonies

  Several hundred farms also raised deer, elk, bison, llamas, and other non-traditional livestock species

- Dairy and livestock processing: $7.700 billion
  - Dairy processing: $4.906 billion in sales
  - Animal slaughtering and processing: $2.779 billion in sales
  - Seafood processing: $6 million in sales

COMPANION ANIMALS

- More than half the households in Michigan own a pet
  - More than 2.0 million dogs and 2.4 million cats
  - Fish, rabbits, different types of rodents, and other pets
- Putting a dollar figure on the veterinary care for companion animals is somewhat difficult because for many pet owners, their pet is a member of the family
  - Non-economic value of the veterinary services provided to pets exceeds their economic value

MI VET EMPLOYMENT BASED ON NATIONAL AVERAGES

- Two-thirds of Michigan's veterinarians exclusively treat companion animals
- About six percent work at universities
  - MSU (primary employer)
- Slightly more than 10 percent focus on farm animals, including horses
- Four percent have mixed practices/companion and farm animals

The state and the federal government employ approximately three percent of veterinarians in MI

MANY NATURAL RESOURCE INDUSTRIES ARE DEPENDENT ON MAINTAINING HEALTHY WILDLIFE

- Estimates from the Michigan Department of Natural Resources (DNR)
  - Recreational anglers spent $2.4 billion in trip-related expenses and equipment in 2011
  - $1.2 billion was spent on wildlife watching expenses
  - 1.1 million people purchased fishing licenses
  - Hunters spent $2.3 billion on trip-related expenses and equipment
  - Michigan had 800,000 licensed hunters, ranking it third in the country for number of hunters

THE IMPACT OF VETERINARY MEDICINE IN MICHIGAN

VETERINARIANS PLAY A CRUCIAL ROLE IN MICHIGAN SOCIETY. IN ADDITION TO CARING FOR PETS, THEY SUPPORT THE MICHIGAN AGRI-FOOD SYSTEM AND MAINTAIN THE HEALTH AND QUALITY OF LIFE FOR BOTH HUMANS AND ANIMALS. VETERINARIANS ARE PREDOMINATELY EMPLOYED IN THREE GENERAL AREAS: PRIVATE PRACTICE, PRIVATE INDUSTRY, EDUCATION, RESEARCH, AND GOVERNMENT. THOSE EMPLOYED BY THE STATE OF MICHIGAN ENSURE THE HEALTH AND SAFETY OF PEOPLE THROUGH THEIR WORK WITH REGULATORY ACTIVITIES, BORDER SECURITY, FOOD PRODUCTION ANIMALS, AND WILDLIFE.

The total economic impact of veterinary medicine in Michigan is estimated to be about $1.447 billion. This includes the direct impact of veterinary services, which is approximately $827 million, and indirect and induced impacts, an additional $620 million. Total employment in veterinary services was approximately 9,300. The number of veterinarians in the state is somewhat difficult to verify. According to data from the Michigan Veterinary Medical Association, there are approximately 2,400 veterinarians in the state. Veterinarians support a wide range of related occupations in the industry; these include veterinary technicians, lab workers, research assistants, and others. The total employment impact of veterinary services is estimated to be somewhat more than 12,600, which should be considered a rough estimate. The appendix outlines the research methodology and defines some of the terms in the report.

Veterinary services are a necessary condition for an animal agriculture industry, and Michigan's is relatively large and growing. In 2014, farm sales of animal agricultural products were $4.088

Dr. Dan Grooms, professor and chair of Large Animal Clinical Sciences, works with students on-site at farms across Michigan. Besides providing excellent teaching opportunities, these on-site visits promote animal and human health as well as community outreach.

billion. In 2014, more than 13,600 farms raised beef and dairy cattle, and there were nearly 2,200 farms that raised hogs. According to the 2012 Census of Agriculture, there were more than 2,300 farms with sheep and lambs, 12,400 farms with horses, 6,700 farms with layers, and 1,150 farms with bee colonies. Several hundred farms also raised deer, elk, bison, llamas, and other non-traditional livestock species.

In turn, animal agriculture supports dairy and livestock processing. In 2013, dairy processing in Michigan accounted for approximately $4.906 billion in sales, animal slaughtering and processing accounted for $2.779 billion in sales, and seafood processing added nearly $6 million in sales. Approximately 9,600 people were employed in these industries in 2013.

Most veterinarians take care of companion animals. More than half the households in Michigan own a pet. In 2011, it was estimated that there were more than 2.0 million dogs and 2.4 million cats in the state. Veterinarians also care for fish, rabbits, different types of rodents, and other pets. Putting a dollar figure on the veterinary care for companion animals is somewhat difficult because for many pet owners, their pet is a member of the family.

Using national averages, about two-thirds of Michigan's veterinarians exclusively treat companion animals, and about six percent work at universities, of which the MSU College of Veterinary Medicine is the primary employer. The University of Michigan also employs several veterinarians, as does Wayne State. Other universities also have an attending veterinarian on staff. Slightly more than 10 percent focus on farm animals including horses, and four percent have mixed practices that handle both companion and farm animals. The state and federal government employ approximately three percent of veterinarians in the state. Private industry, especially in the health care sector and animal care sectors, also hire veterinarians as part of their research efforts. Veterinarians play a crucial role in biomedical research, both at universities and at private firms.

Natural resource industries are another area impacted by veterinarians. Many natural resource industries are dependent on maintaining a healthy wildlife. According to the Michigan Department of Natural Resources (DNR), the state's recreational anglers spent $2.4 billion in trip-related expenses and equipment in 2011. The DNR also estimates that $1.2 billion was spent on wildlife watching expenses. In 2011, 1.1 million people purchased fishing licenses.

Hunters spent $2.3 billion on trip-related expenses and equipment in 2011. The state has almost 800,000 licensed hunters, ranking it third nationwide for number of hunters.

In summary, veterinarians play a critical role in both the economic and non-economic welfare of the state. Veterinary services generate approximately $827 million in sales and salaries. The total economic impact of veterinarians in the state is estimated to be in excess of $1.447 billion. In some respects, these figures underestimate the true economic impact because of the important role veterinarians play in the support of the agri-food system.

Veterinarians also do much to protect the public health by treating and testing both livestock and wildlife. This aids in the prevention of the spread of zoonotic diseases from animals to humans. Through their work with companion animals, veterinarians also do a great deal to enhance the quality of life for pets and the people who own them. An increasingly stringent regulatory environment coupled with potential disease outbreaks such as avian influenza and Chronic Wasting Disease (CWD) will increase the demand for veterinary services in the future.

This brief analysis estimates the economic impact of veterinarians. It also analyzes the industries that are impacted by their work, especially with respect to animal agriculture, food processing, and natural resource-based activity. A short discussion of some future trends and issues, such as new regulations and issues with potential disease outbreaks, is also included.

ECONOMIC IMPACT

As mentioned in the introduction, the total economic impact of the veterinary profession is approximately $1.447 billion. The breakdown by type of employment is shown in table 1.

Type of Employment	Direct Impact ($1,000s)	Total Impact ($1,000s)
Private Practice	780,755	1,365,000
Universities	26,974	47,174
State Employment	3,520	6,454
Federal Government	1,438	2,443
Private Industry	14,800	25,874
Total	**827,487**	**1,446,945**

Table 1: Economic Impact of Veterinarians by Type of Employment

These figures need to be interpreted carefully. The direct impact of the state and federal governments, as well as private practice, is based on the salaries and benefits of the veterinarians. Private practice and university figures are based on the total sales of cases for private-practice veterinarians and the salaries and benefits of veterinarians at the MSU College of Veterinary Medicine. The impact of employment at other universities is also included; several universities, especially the University of Michigan, employ veterinarians to oversee their animal research programs. In the case of both private practice and universities, this includes the services of people without a Doctor of Veterinary Medicine degree, such as office staff, veterinary technicians, and others. Without veterinarians, these auxiliary activities and staff would not exist. The total direct impact of veterinary services is estimated to be $827 million.

The total economic impact, including indirect and induced impacts, is estimated to be $1.447 billion. The impact on employment also was estimated, the vast majority of which is a result of private practice. According to the US Census Bureau, the 957 locations that offered veterinary services employed 9,064 people. Total employment resulting from private veterinary practice is estimated to be about 12,280. Universities employ approximately 125 veterinarians; the total impact on employment is estimated to be 168. This likely understates the impact of the university because only staff with Doctor of Veterinary Medicine degrees are included. There are approximately 25 veterinarians employed by the state, most of which are employed by the Department of Agriculture and Rural Development. The Department of Natural Resources and the Michigan Department of Health and Human Services also employs veterinarians. The total impact on employment of state government is 33. The federal government currently employs approximately 14 veterinarians in the state, although additional veterinarians will be employed once the new swine processing plant is in operation. The

US Department of Agriculture hires veterinarians to do inspections at processing plants, and the US Customs Service also employs veterinarians to maintain border security and prevent the spread of disease from other countries to the United States. The total employment impact is estimated to be 18.

Private industry also hires veterinarians. These veterinarians do research on both human health and animal health issues. They work for pharmaceutical firms, feed companies, and other organizations. Obtaining an estimate for Michigan is difficult. On a national level, approximately 3.1 percent of all veterinarians work for private industry. Applying this figure to the number of veterinarians in Michigan yields an estimate of 74 veterinarians working in the private sector. Their total impact on employment is estimated to be 100. The private sector figures should be considered rough estimates. To summarize, the total direct impact of employment is estimated to be 9,300 with a total impact of employment in the state estimated to be 12,600.

Necropsy facilities at MSU's diagnostic laboratory.

IMPLAN, a standard economic impact software package, was used to generate the total economic impact. In addition to the direct impact of sales and salaries, the total economic impact includes indirect and induced effects. Indirect impacts include inter-industry purchases as they respond to the activity under consideration—in this case, veterinary services. This includes pharmaceutical sales, utilities, medical supplies, and other purchases. Induced impacts

are changes in household spending as a result of the activity under consideration. Induced impacts would include things like clothing purchases and movie and sporting event tickets. A more in-depth discussion of the methodology used is found in the appendix.

SUPPORTING INDUSTRIES AND ACTIVITIES

Production Agriculture and Food Processing

Access to veterinary services is necessary for the existence of animal agriculture. Michigan is a major producer of some livestock products and the industry is growing, especially in regards to poultry and hog production. Table 2 shows farm sales of some of the animal species and commodities in the state.

Species	Number	Value of Sales ($1,000s)
Cattle and Calves Sold	374,000	664,566
Hogs and Pigs Sold	2,070,000	402,618
Dairy Cows	380,000	2,309,985
Turkeys Raised	10,500,000	320,276
Egg Production	3,867,000,000	325,322
Bee Colonies/Honey Sales***	78,995	14,333
Sheep Shorn for Wool	63,000	327
Aquaculture Farms**	87	5,555
Sheep and Lambs Sold*	60,567	10,327
Goats Sold*	11,945	1,602
Equine Sold*	9,768	28,918
Deer Sold*	2,293	3,217
Bison Sold*	493	871
Elk Sold*	199	418
Llamas Sold*	143	96
Total Sales		**4,088,431**

Table 2: Sales of Selected Livestock Products

* 2012 Figure; ** 2007 Figure; *** Bee Colonies 2012 figure, sales 2014 figure

Source: USDA Agriculture Statistics, 2012 Census of Agriculture

The figure for equine should be interpreted carefully and underestimates the true value of the industry. The number in Table 2 only considers sales. Other activities such as trail rides, horse racing, lessons, boarding, and other related activities are not considered. The value of these other activities likely far exceeds the value of sales of equine. There also are a few livestock production activities that occur in Michigan that are not in Table 2 due to a lack of sales figures. These include mink, rabbits, and

certain types of bird species such as pheasants and peacocks. It is unlikely that these species have a major impact on the total sales of all livestock commodities.

While Michigan farmers raise a wide range of livestock species, traditional types of livestock dominate the industry. Dairy production is particularly important, accounting for almost 50 percent of all sales. Other major farm activities include beef, hogs, turkeys, and eggs. Egg and turkey production has increased dramatically. In 2014, Michigan ranked seventh in the nation in milk production, eighth in egg production, and twelfth in the number of hogs. The number of hogs in the state is likely to increase fairly dramatically as a result of the new processing facility located in Coldwater.

Production animals and food processing are fairly widespread activities for Michigan farmers. Table 3 shows the number of farms that raise different livestock species.

Species	Number of Farms
Cattle (including dairy)*	13,626
Hogs*	2,198
Sheep and Lambs	2,312
Horses and Ponies	12,413
Layers	6,783
Bees	1,151
Bison	89
Deer	199
Elk	43
Alpacas	360
Llamas	462
Mink	8
Rabbits	740
Other Livestock	39

Table 3: Number of Farms Raising Different Livestock Species in Michigan

* 2014; all other numbers are for 2012

Source: Agricultural Census and Agricultural Statistics

It should be noted that some farms may have more than one species on their farms. For instance, some farmers produce beef as a side business to milk production. Some farmers also may have more than one species as part of 4H projects. Veterinarians play a key role in maintaining public health by ensuring 4H animals are healthy and free from communicable diseases. Horses also are

commonly found on farms for recreational purposes. Many non-farmers also own horses; it is estimated that there are approximately 118,000 horses in the state. In many respects, horses are an animal that is both pet and livestock.

Farm animal veterinarians indirectly support some food processing industries. Those who work in meat processing plants directly support food processing industries by inspecting animals and carcasses. Table 4 shows the level of employment and sales for some livestock-based food processing industries in 2013.

Industry	Number of Employees	Sales ($1,000s)
Dairy Product Manufacturing	4,100	4,905,704
Animal Slaughtering and Processing	5,483	2,779,005
Seafood Product Preparation and Packaging	20	5,968
Total	**9,603**	**7,690,677**

Table 4: Employment and Sales in Animal Food Processing Industries
Source: US Census Bureau

In 2013, more than 9,600 people worked in animal processing industries with more than 5,400 in animal slaughtering. This number will increase dramatically when the new hog processing plant in Coldwater, MI begins producing pork products. An additional 4,100 people work in dairy processing plants, and there also is interest in expanding dairy processing throughout the state. Egg and turkey production also appear to be rapidly increasing.

Pets

As mentioned in the introduction, most veterinary services focus on companion animals. More than half of all Michigan households owned pets in 2011 (AVMA, page 9). Nationwide, more than 60 percent of pet owners saw their pet as part of the family, and only 1 percent saw them as property (AVMA, page 5). This is especially true for dog and cat owners. As a result, the noneconomic value of the services of veterinarians and related staff exceeds the fees they earn.

Dogs and cats are popular pets in Michigan. In 2011, 34.6 percent of households owned dogs; the total dog population was 2.04 million. In the same year, 31.3 percent of Michigan households owned cats; the total cat population was 2.42 million. Many households have more than one dog or cat and some have both dogs and cats.

There are many other types of pets owned by Michigan residents. Table 5 shows the estimated number of pets in the state in 2011.

Species	Number of Animals (thousands)
Birds	250
Fish	1,860
Ferrets	24
Rabbits	103
Hamsters	37
Guinea Pigs	44
Gerbils	15
Other Rodents	28
Turtles	73
Snakes	37
Lizards	36
Other Reptiles	23

Table 5: Estimated Pet Ownership by Species
Source: Michigan Veterinary Medical Association

These numbers should be considered estimates. The figures represent the total number of animals in the United States multiplied by Michigan's share of the population. The actual numbers will be somewhat different, but with few exceptions, the scope of the numbers is likely to be fairly accurate.

The wide variety of animals listed in Table 5 indicates the range of skills required by veterinarians. They need to be able to treat mammals, fish, birds, and reptiles. All of these animals add to the quality of life to their owners.

Wildlife

Veterinarians also contribute to the health and wellbeing of Michigan's wildlife. Of particular importance is their role in preventing diseases from spreading among animals and between species, including humans. The DNR estimates that hunting generates $2.3 billion in economic activity and is responsible for 34,473 direct jobs. The DNR also reports that sport fishing generates $2.5 billion in economic activity and accounts for 37,989 direct jobs. Viewing wildlife also is a popular activity in the state; according to the DNR, spending in this activity and related expenses was $1.2 billion.

Of particular importance is the health of Michigan's deer herd, which is a major component of the hunting industry. The state is currently

attempting to limit the impact and spread of Chronic Wasting Disease (CWD), which was recently diagnosed for the first time in the free ranging deer population, and veterinarians will play a key role in this effort.

FUTURE CONSIDERATIONS

There are two trends and developments that will impact the market for veterinary services in the future. The first is the Veterinary Feed Directive, a set of policies instituted by the Food and Drug Administration that restricts the use of antibiotics in food animals. Some antibiotics previously used by farmers to promote growth are no longer allowed. Therapeutic use under veterinary supervision is allowed. The Veterinary Feed Directive will increase the demand for veterinary services, especially as the number of animals in the state increases. The workload and the demand for livestock veterinarians will increase.

The second issue is the role veterinarians play in preventing and controlling communicable diseases that pose a threat to animal and human health. So far, the state has been able to avoid an avian influenza outbreak, but such an outbreak could have dramatic effects on both egg and turkey production, potentially costing the state tens of millions of dollars. A widespread CWD outbreak also could adversely affect the hunting industry and related businesses. A study of the CWD outbreak in Wisconsin indicated that the

economic impact of the outbreak was $5 million (Bishop). The impact in Michigan would likely be greater given the higher quantity of hunters. A large-scale CWD outbreak is likely to permanently reduce deer hunting in the state. Currently, there is a small outbreak in the Ingham County area and veterinarians are playing a key role in the efforts to curb the outbreak and eliminate the disease.

CONCLUSIONS

Veterinarians play an important role in Michigan's economy and in enhancing the quality of life of its citizens. Those that focus on farm animals contribute to an animal farm sector that generates approximately $4.1 billion in sales. More than 10,000 farms raise livestock. In turn, the farm livestock sector supports an animal processing sector that generates $7.7 billion in sales and employs more than 9,500 people. Increasing animal quantity, changes in Food and Drug Administration regulations, and potential disease outbreaks will increase the demand for veterinarians.

Veterinarians also play a role in supporting natural resource industries. When combined, the hunting and sports fishing industries generate an estimated $4.8 billion in total economic activity. Spending associated with wildlife viewing accounts for an additional $1.2 billion. Veterinarians also play an important role in maintaining a barrier between wildlife, domestic animals, and human beings.

While the economic impact of pet ownership is somewhat difficult to ascertain, it may be the most important aspect of the veterinarian's role in Michigan's society. Most veterinarians work with companion animals, and Michigan residents own a wide range of pets from dogs and cats to reptiles and other non-traditional species.

Most veterinarians are engaged in private practice. These veterinarians and related services generate more than $780 million in sales and a total economic activity of $1.365 billion. The total direct impact of veterinarians employed by private firms, private practices, and universities and government agencies is estimated to be $827 million with a total economic impact of almost $1.4447 billion. Private veterinary practices employ more than 9,000 people. Direct employment of veterinarians and related providers is more than 9,300 people with a total impact on employment of more than 12,600. These results indicate that veterinarians play an important role in Michigan's economy.

APPENDIX: Methodology and Data Sources

IMPLAN, a standard economic software package, was used to generate the results of the economic impact of veterinarians from direct effects. In this case, sales generated by private practice and salaries and benefits for MSU College of Veterinary Medicine and public sector employees have been used to estimate the total impact on the state's economy. This includes the direct impacts and the indirect impacts, which are changes in the inter-industry purchases as they respond to the directly affected industry. It also includes induced impacts, which reflect changes in household spending as a result of the activity—in this case, veterinary services.

IMPLAN uses the following assumptions to derive its results: constant returns to scale, no supply constraints, fixed commodity input structure, and homogenous sector output. IMPLAN also assumes the technology used is constant (IMPLAN, page 103).

Constant returns to scale means that if output increases, the amounts of the inputs used increase by the same proportion. No supply constraints mean that inputs are unlimited and that output is limited only by the demand for its products. This assumption is not an issue in this study; this is actual output, not potential output. Fixed commodity input structure means that firms will not substitute one input for another if input prices change. Homogenous sector output means that the proportions of all the commodities produced by the industry remain the same as output increases or decreases. As a result of these assumptions, the results of the economic impact and the impact on employment should be considered estimates. This is particularly true for the employment estimates.

Data on pets is from the American Veterinary Medical Association's Publication U.S. Pet Ownership & Demographics Sourcebook, 2012

Edition. The figures for cats and dogs come from this publication. For less common species, the national population was multiplied by Michigan's share of the US population. As a result, these figures should be considered estimates that give a general idea of the number of these pets in the state.

The figure for private veterinary services is from the 2012 Economic Census, and as a result is somewhat dated. This figure may slightly underestimate the value of private veterinary services. The figures for state and federal government were obtained through interviews with state and federal employees. The state federal number is based on salary and benefits for veterinarians multiplied by the number of veterinarians. The figures for universities are based on information gathered from university websites. In some cases, the national average salary for university faculty members was used to generate the results.

Agricultural data used the most recent information available from the annual Agricultural Statistics figures. When more recent data was not available, data from the 2012 Agricultural Census was used. The figures for food processing come from the 2013 Annual Survey of Manufacturers generated by the US Census Bureau. Since these figures are also slightly dated, they may somewhat understate the current impact. The economic impact figures for natural resource activities come from the DNR website.

The diagnostic laboratory at the MSU College of Veterinary Medicine.

SOURCES

American Veterinary Medical Association (2012). *U.S. Pet Ownership & Demographics Sourcebook 2012 Edition.*

Bishop, R.C. (2014). "The Economic Impacts of Chronic Wasting Disease (CWD) in Wisconsin", *Human Dimensions of Wildlife*, Vol. 9, No. 3: 181-192.

Dicks, M., B. Bain, and R. Knippenberg (2015). *2015 AVMA Report on Veterinary Debt and Income.*

Dicks, M., B. Bain, and R. Knippenberg (2015). *2015 AVMA Report on Veterinary Employment.*

Minnesota Implan Group (2004). *Users Guide, Analysis Guide, Data Guide, IMPLAN Pro Version 2.0.* Stillwater: Minnesota IMPLAN Group.

The MSU College of Veterinary Medicine acknowledges the Michigan Veterinary Medical Association for the support of this study.

MICHIGAN STATE
UNIVERSITY

College of Veterinary Medicine