2017 AVMA Report on

THE MARKET FOR VETERINARY SERVICES

AVMA Veterinary Economics

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SUMMARY

Among the veterinary markets assessed in this and the previous reports on the veterinary markets produced in 2017 by the American Veterinary Medical Association (AVMA) Veterinary Economics Division (VED), the market for veterinary services is seen as one marked by a high degree of complexity. To help veterinarians conceive strategies to meet new business challenges, economic trends need to be identified, drawing from a diverse set of data and other information – an effort undertaken by the AVMA VED to close "gaps" in knowledge to enable practitioners to more effectively direct their businesses. Practice management research is critical to developing a greater understanding of the dynamics that shape the veterinary services market; ongoing research will be important to gain deeper insight into factors underlying potential opportunities for veterinary practices to more deeply penetrate the share of the necessary pet health care needs of animal-owning households.

Federal government statistics show that over the past decade, the size of the market for veterinary services has grown consistently, reaching approximately $38 billion in total output in 2015. This expansion could be attributable to a number of factors: more pets and other domestic animals; new or expanded animal welfare regulations; and an increased tendency of pet owners to place value on their pets – or the strengthening of the human-animal bond. Of overriding importance is consumers' willingness to pay for services – a propensity that is somewhat dependent on household income. Hence, an improved U.S. economy as is expected, and the resultant increase in household incomes should build demand for veterinary services.

Pet owners' willingness to purchase veterinary services is but one contribution of the veterinary profession to nation-wide economic activity. Expenditures at veterinary hospitals constitute the direct impact of veterinary services on the total revenue of the economy. But the capacity to deliver these services is predicated on a vast array of "inputs" to the system: Veterinarians need education/training, supplies, equipment, pharmaceuticals, facilities and staff. These factors represent activity generated by other businesses, which also contribute to the overall economy. The market for veterinary services alone, however, comprises a $33 billion industry made up of tens of thousands of firms, according to an industry model whose data are derived from the U.S. Bureau of Economic Analysis, Bureau of Census, and Bureau of Labor Statistics.

DETERMINING DEMAND

At five-year intervals the AVMA conducts its Pet Ownership and Demographics Survey (PDS), counting the number of pets in the nation. The latest study took place in 2017, and analysis of the results will be summarized in the *2018 AVMA Report on the Market for Veterinary Services*. The purpose of the PDS is "to serve the veterinary medical profession and all other individuals who need to make decisions about the health care and product marketing demands associated with the companion animal industry and ... to update and expand our knowledge about the companion animal population in the United States regarding demographic characteristics and use of veterinary medical services." Specific PDS objectives are "to determine populations of dogs, cats, birds, horses and other pets owned by U.S. households; household demographic characteristics associated with pet ownership; and frequency of times that pets were seen by a veterinarian and annual veterinary medical expenditures." (Wise, 1992)

The PDS has provided a national estimate of the number of pets of all types, frequency of visits to the veterinarian and the expenditure on veterinary services or products and market size – insufficient data to measure demand. The yearly expenditure reported by a household is a distinct number reflecting the total amount paid to veterinarians in the year surveyed, but demand is a set of quantities purchased or, equally important, not purchased at each price by pet owners. To measure demand for veterinary services, the AVMA VED collaborated with the National Center for Food and Agricultural Policy in late 2015 to field a metropolitan market demand study of single multi-county market areas, establishing a survey mechanism to help understand the relationship between the demand for veterinary services and certain market demographics. An interesting finding of the pilot concerned routine check-ups. While the 2012 PDS noted that about 20 percent of dog owners had not visited a veterinarian in the past 12 months, when given more choices as to where the canine pet might have received a routine check-up in the past 12 months, 80 percent of canine owner respondents to the pilot indicated having obtained a routine check-up in the last 12 months. Another 13 percent, however, indicated they had received a routine check-up at an alternative to a traditional veterinary hospital or clinic. What this says about unaccounted for demand looks to be a topic of further pursuit to better understand competitive dynamics and to construct valid responses.

Also in 2015 the AVMA worked with the American Association of Bovine Practitioners (AABP) to survey the latter's membership in order to better understand some of the unique aspects of the veterinary markets that affect bovine veterinarians. AABP members work on a diverse group of animals, with the bovine categories clearly dominating revenue: 30 percent of the respondents indicated that 76 percent-100 percent of their revenue is from veterinary products and services associated with dairy animals and 5 percent of respondents reported that more than three-quarters of their revenue comes from cow-calf products and services. Small ruminant, swine, equine and, in particular, companion animals, however, also comprise a share of the revenue of AABP-member-owned veterinary practices. Nearly three-quarters of practices reported service call fees amounted to less than 10 percent of their gross revenue, while 11.5 percent of practice indicated that reproductive services drew 41 percent-50 percent of practice revenue.

In 2016 the AVMA entered into collaboration with the American Association of Equine Practitioners (AAEP) to conduct a survey of U.S. equine veterinarians, an effort that also sought to understand the unique problems facing this segment of the profession. Equine veterinary practice makes up less than 5 percent of all veterinary practice types in the veterinary medical profession. Veterinarians identifying as working with equids, whether in an exclusively or predominantly equine practice, or in a mixed animal practice, are a minority in the field. Ownership trends in the equine industry, and thus economics in the equine veterinary industry, were by and large negative in the years following the recession of 2008. AVMA data indicate that the pet horse population in the nation declined by a third between 2006 and 2012, and that the population of horses on farms that reported at least $1,000 in annual sales dropped by 10 percent. Additionally, there was a 6.7 percent reduction in the annual income of equine veterinarians during that same period.

While both sectors of the profession have distinct characteristics, and market conditions, associated specifically with their sector, reports from both practice segments tell of a threat posed by parallel service providers, who focus on the more routine tasks of animal care. Such non-veterinarian providers of veterinary services are claimed by more than 60 percent of the AABP respondents to have taken business from them, while more than 84.7 percent of the AAEP respondents have lost business to parallel service providers.

INHALANTS AND INSURANCE

Another way to peer into the veterinary services market is through examining animal health product supply data – from which a profile of the current market can be drawn, and insight into macro trends within the companion animal market gained. Data also serve as a leading indicator of industry changes. Product market analysis can, for example, be used to gauge changes in specific practice profit centers. For instance, sales of inhalant anesthetics can afford a useful indicator of surgical and dental activity. Inhalants are used specifically for advanced procedures requiring patient anesthesia, consumed in unit increments, and administered on an as-needed basis across the operational year. Use by practice type provides an indication of where surgical and dental procedures are being most performed and how that market share changes over time. By studying the share of inhalants as an average of the number of practices in each practice type, low-cost providers can be observed using twice as much inhalant, and emergency/specialty practices 2.5 times as much as small animal primary care practices.

A statistic tossed about in the industry says that pet owners with pet health insurance visit veterinary clinics more frequently and spend more money than do pet owners without pet health insurance. Multiple factors specific to the animal, consumer and veterinarian, however, influence the services purchased. The only way to determine the independent effect of insurance on consumer behavior is to control for the individual characteristics that could affect purchases of both veterinary care and pet health insurance. In 2014 AVMA partnered with Mississippi State University to start the process of evaluating the effect of pet health insurance on the demand for veterinary services. Findings arising from the collaboration did convey that pet owners with insurance spend more on the pet, not only on veterinary care, but also on other expenses such as entertainment, food and boarding. More information will be released as the study advances, and the full set of control variables is determined.

The *2017 AVMA Report on the Market for Veterinary Services* turns attention to the public practice of veterinary medicine, which includes public health services such as monitoring and managing food safety and zoonotic diseases, recognizing that the threat posed by the latter is not only a public health concern for the nation – but also for the world.

INTRODUCTION

The most important of the three veterinary markets for the veterinary profession is the market for veterinary services. The demand for veterinary services, animal owners' willingness to purchase animal health products and services from veterinary practices, guides the demand for veterinarians and applicants to veterinary colleges. As the demand for veterinary services rises relative to the supply of veterinary services, the price of these services will increase, leading to an increase in the demand for veterinarians and the income of veterinarians. The increasing income of veterinarians relative to the costs of the education required to become a veterinarian will increase the demand for veterinary education and thus veterinary college applicants.

The concept of excess capacity was new to the veterinary profession in the 2013 AVMA Workforce Study. Excess capacity is a measure of the demand for veterinary services relative to the supply of veterinary services at a specific price. When excess capacity is increasing, the supply of veterinary services is growing faster than the demand for those services, prices of services should fall, veterinary incomes decline and the demand for veterinary college seats decline.

A number of factors affect excess capacity, including growth in the number of households with animals, number of animals per household, change in the human-animal bond, changes in the prices of veterinary products and services in relation to the change in the price levels of other items in a household's market basket, and the change in incomes of animal-owning households.

Since 2013, the number of households with pets has increased, the human-animal bond has been strengthening, and median U.S. household incomes have grown. These factors would suggest that excess capacity has been declining and that the demand for veterinary goods and services, the demand for veterinarians and the demand for veterinary college applicants should be increasing.

In the *2017 AVMA Report on the Market for Veterinarians*, the number of jobs available through the AVMA Veterinary Career Center (VCC) exceeded the number of applicants in the fall of 2016 for the first time since before the recession. Veterinary incomes and starting salaries increased even in the face of a rising supply of new veterinarians. More than 3,000 veterinary full-time equivalents (FTE) were required in 2016 to meet the demand associated with the large negative underemployment (hours per week veterinarians desire to work less with less compensation greater than the hours per week that veterinarians desire to work more for more compensation).

As a veterinary key performance indicator (KPI), excess capacity should be measured annually using a consistent, analytical process so that the value can be compared across the years as a measure of the economic health of the profession. Excess capacity, however, is a physical measure and does not provide ample information about the financial health of the profession. A decline in excess capacity may be a positive indicator unless it is achieved through a reduction in the profitability of the profession. The 2013 AVMA Workforce Study included several assumptions because data were not available. As these assumptions are replaced with data, the baseline value of excess capacity computed for 2012 may change. Going forward, as new data are collected, the impact of this new data to the baseline estimate of excess capacity will be provided. In the meantime, consider the current estimate of 12.7 percent excess capacity in the veterinary services market. Is that considered high? And can it be compared to other markets?

The Federal Reserve Board measures and tracks capacity utilization in manufacturing, mining and utilities sectors. Excess capacity is the complement of capacity utilization. The Federal Reserve Board estimates that manufacturing excess capacity was 36.5 percent at the bottom of the last recession, returned to a low of 24.2 percent in February of 2012 and remains near that mark, at 24.1 percent, as of June 2017 (Federal Reserve Board 2017). In previous economic expansionary periods, however, excess capacity dropped to less than 15 percent in manufacturing and thus there is still considerable excess capacity in manufacturing today. While the measure of manufacturing excess capacity provides an example of the effect of the national economy on the manufacturing sector, this measure refers to physical capacity rather than labor capacity, although the two may be linked.

Currently the AVMA Economics Division knows of no measures of excess labor capacity in other service industries, so no accurate comparison can be made. Additionally, the problem becomes even more complicated because measuring labor for veterinary services can suffer from substitution bias. For example, the primary functions of a veterinarian include making diagnoses, and prescribing treatment and medications. A veterinary technician works alongside the veterinarian and often performs functions such as creating radiographic images, collecting and performing diagnostic tests on blood samples, and explaining follow-up care and compliance. A veterinarian might often take over these or other duties. In doing so, this is not wasted time, but it may be more efficient and economical for

the veterinarian to perform the medical and diagnostic functions for which they are highly trained and delegate routine tasks to a veterinary technician, hence the substitution bias.

All indicators in the three veterinary markets continue to indicate that the general U.S. economic recovery is creating positive results for the profession. Unfortunately, this turnaround could rob the profession of the inducement for innovation in veterinary practices necessary to provide a larger share of the health care requirements of the animals in the practice business area.

This report focuses on the market for veterinary services. In the three vertically related veterinary markets, the market for veterinary services is a combination of the need for veterinary medical services or other skills and training that veterinarians have to offer, and the ability of the profession to provide these services by educating, training and certifying veterinary medical professionals. The demand for veterinary services comes from a variety of sources, among consumers and the general public.

REGIONS OF THE UNITED STATES

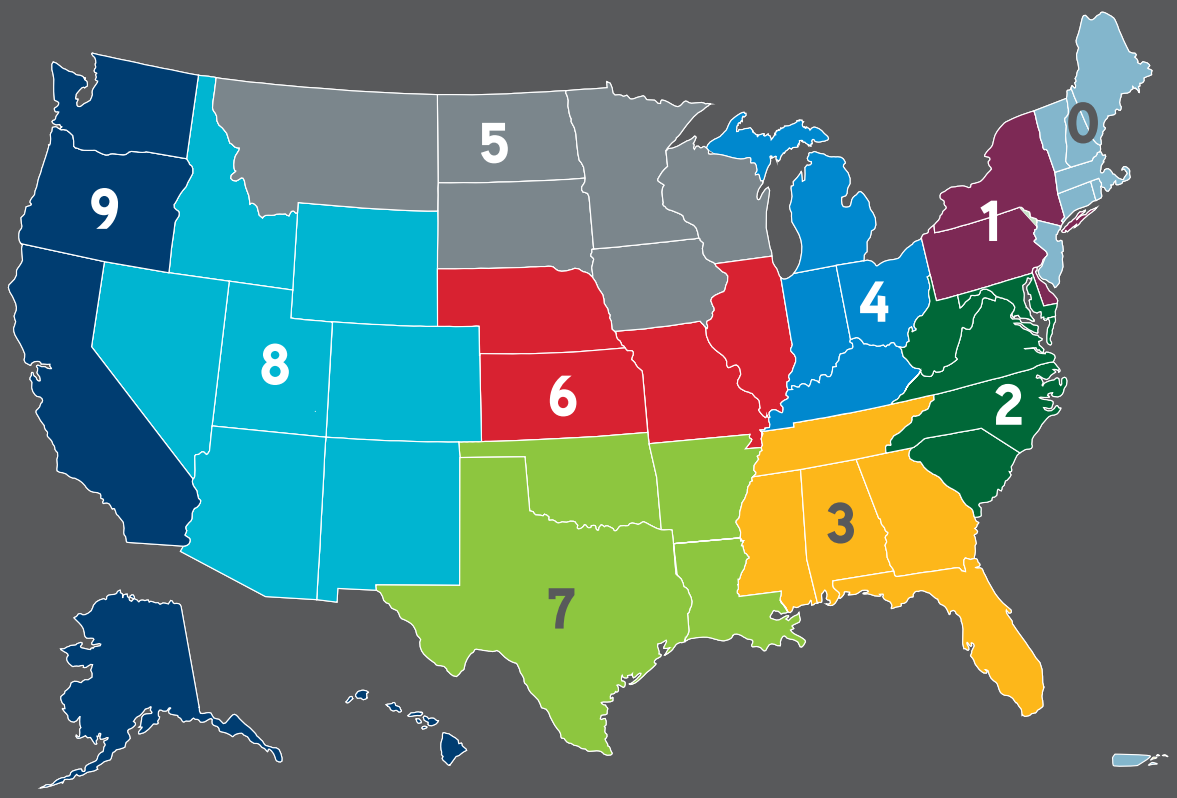


Figure 1

DEMAND FOR PRIVATE PRACTICE VETERINARY SERVICES

The demand for private practice veterinary services is one of the most complex and least understood parts of the veterinary markets.

The demand for private practice veterinary services is one of the most complex and least understood parts of the veterinary markets. Data and information are needed to identify trends, understand the underlying factors yielding these trends, and create strategies for veterinarians to adapt to their ever-changing business environments. The AVMA VED is shifting the conversation by filling in as many of the knowledge gaps as possible. The AVMA VED intends to use this avenue to publish not only information on the veterinary industry, but also financial ratios and practice information so that veterinarians in private practice know how to gauge and track their own progress.

A key missing component in the market for veterinary services is practice management research. While the AVMA VED has developed an extensive research program to better understand the animal health care decisions made by animal owners, no organized research offers insight into the supply of veterinary products and services. More explicitly, research is needed to better determine what factors or strategies are successful for veterinary practices to gain a larger share of the animal-owning households' animal health care needs.

OUTPUT OF THE VETERINARY INDUSTRY

The market for veterinary services has consistently increased in size over the past decade, according to statistics from the United States Bureau of Economic Analysis, reaching approximately $38 billion of total output in 2015 (Figure 2). This expansion might be attributable to multiple factors, including an increase in the number of pets and other domestic animals; regulations enacted by state and federal governments to enhance animal welfare, prevent animal abuse, and ensure that all animals receive the care that they deserve; and the evolution in the value placed on pets by their owners. Most importantly for the veterinary profession, because a consumer's willingness to pay for services is at least partially dependent on household income, a projected improvement in the economic condition of the U.S. economy – and an increase in household incomes derived from a recovery – is expected to further increase the demand for veterinary services.

VETERINARY INDUSTRY OUTPUT, 1998-2015

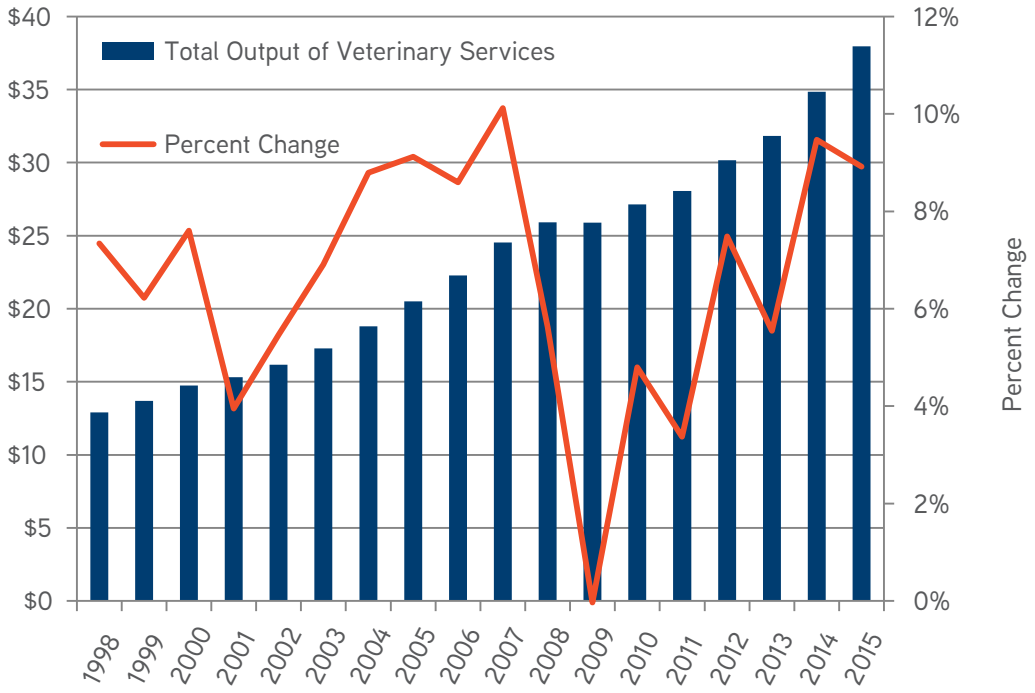


Figure 2

The number of establishments was obtained from the Barnes Reports on U.S. Industry & Market Outlook – Veterinary Services Industry. The veterinary service sector (541940) as defined by the North American Industry Classification System (NAICS) and used in the Barnes Reports comprises entities that sell veterinary services to animal owners as well as establishments that supply testing services to veterinary practitioners. The Barnes reports provide an estimated number of establishments, employees, and the total value of output at state and national levels for the current year and offer a prediction of these variables for the next two years. In addition to the state and the national data, the reports present the same variables for the U.S. metropolitan areas. The industry is divided by subgroups relative to the size of establishment. In 2015, for example, the veterinary services industry encompassed 37,840 establishments composed of 9,306 establishments employing between one and four people; 8,736 establishments with a capacity of five to nine people; 8,832 establishments with 10 to 19 employees each; 3,376 establishments in the category of having 20 to 49 employees; 293 establishments with a total employee group of 50 to 99 workers; 10 establishments with more than 500 employees each; and 7,229 single-operator establishments. The following table presents the estimated and projected number of establishments, employees, and the value of industry sales from 2014 to 2018 as reported in the 2013 edition of the Barnes Report.

The next table shows the state total employment as estimated by Barnes Reports and as reported in the 2013 data from IMPLAN. IMPLAN (Impact Analysis for Planning) is an economic input-output model designed for economic impact analysis. Originally developed by the USDA Forest Service and now maintained by the Minnesota IMPLAN Group, it measures the economic and social impacts of a change in an industry to the larger economy.

The difference in the total employment between the two sets of data might lay in the definition of the industry. In fact, the IMPLAN sector 459 (veterinary services) does not match the same definition as NAICS 54194. For instance, pet stores are included in retail stores (sector 400 – 401) in IMPLAN, not in sector 459.

The different veterinary practice types have a unique set of expenditures (production function) that was defined based on practice-owner responses to the AVMA Compensation Survey. Using the U.S. national input-output modeling system, the total employment, income, output and taxes paid is estimated for each practice type.

EFFECT ON EMPLOYMENT, INCOME AND OUTPUT BY PRACTICE TYPE				
	Total Employment (thousands)	Total Income ($millions)	Total Output ($millions)	Tax on Production & Imports ($millions)
Food Animal Practice	45	1,507	3,057	57
Small Animal Practice	205	6,780	13,755	255
Equine Practice	36	1,205	2,445	45
Mixed Practice	136	4,520	9,170	170
Other Practice Types	32	1,055	2,140	40
Total Veterinary Services	**455**	**15,066**	**30,566**	**567**

Table 1

The following table gives an estimate of the number of employees in the veterinary industry per state.

VETERINARY INDUSTRY EMPLOYMENT BY STATE, 2015			
Alabama	5,000	Montana	1,655
Alaska	759	Nebraska	2,558
Arizona	7,059	Nevada	2,960
Arkansas	2,463	New Hampshire	2,007
California	34,970	New Jersey	8,247
Colorado	7,950	New Mexico	1,941
Connecticut	4,351	New York	16,180
Delaware	1,083	North Carolina	11,913
D. of Columbia	398	North Dakota	756
Florida	22,005	Ohio	13,395
Georgia	10,564	Oklahoma	4,299
Hawaii	1,046	Oregon	6,065
Idaho	1,967	Pennsylvania	13,237
Illinois	13,021	Rhode Island	807
Indiana	7,056	South Carolina	4,913
Iowa	3,668	South Dakota	998
Kansas	4,262	Tennessee	7,254
Kentucky	4,779	Texas	25,826
Louisiana	4,820	Utah	2,384
Maine	1,750	Vermont	1,017
Maryland	7,049	Virginia	11,475
Massachusetts	9,519	Washington	8,939
Michigan	9,520	West Virginia	1,706
Minnesota	6,254	Wisconsin	6,935
Mississippi	2,525	Wyoming	856
Missouri	6,506	**U.S.A.**	**338,667**

Table 2

While the total economic impact of the veterinary services sector is small (roughly 0.35 percent) as a share of GDP, the importance of this sector is much greater for smaller rural and suburban communities. In addition, the model is not able to calculate the amount of output that would not have been produced as a result of losses from prevented disease events, had these incidents not been addressed by veterinary services. The very nature of veterinary services to manage animal diseases provides a benefit to society that is not measured in the GDP statistics.

Had money been spent to manage disease outbreaks, that money would have been drawn from the consumption of other products and services. Whether this transfer of expenditures would increase or decrease GDP depends on the economic activity that is associated with managing disease outbreaks versus the economic activity associated with the products and services that must be reduced to provide resources for managing disease outbreaks.

NUMBER OF PRIVATE PRACTICE VETERINARIANS BY STATE, 2013

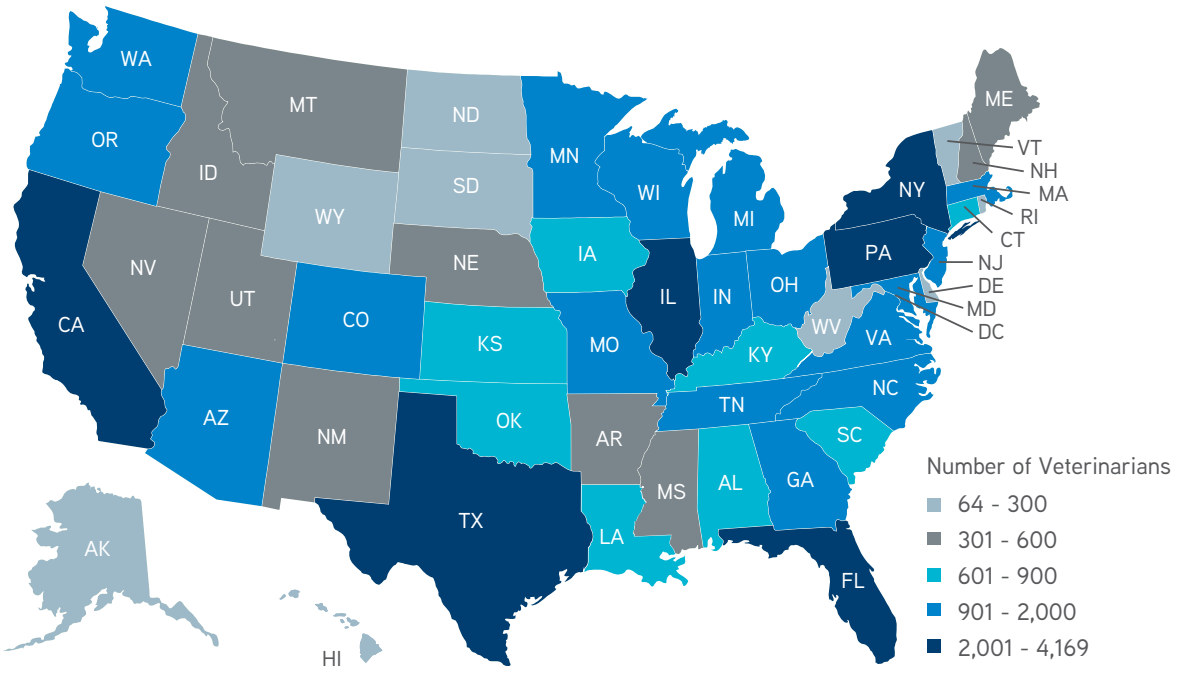


Figure 3

The distribution of veterinarians across states aligns with the distribution of veterinary practices, as those states with the largest (or smallest) number of veterinarians also have the largest (or smallest) number of veterinary practices. This suggests that the distribution of size of veterinary practices likely does not vary much between states.

NUMBER OF VETERINARY ESTABLISHMENTS BY STATE, 2015

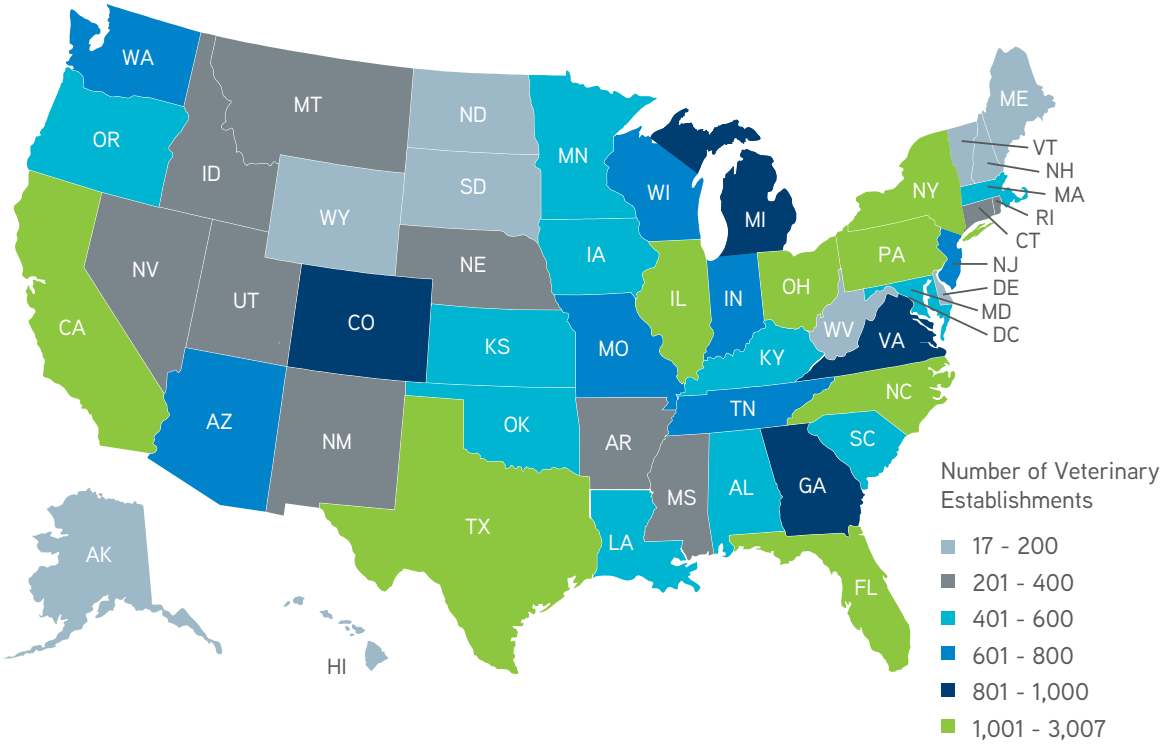


Figure 4

The distribution of practices by size indicates that the 10-year growth of practices has occurred in all categories across firm size. During the 10-year period from 2002-2013 veterinary practices within firms that have one to four employees have grown by nearly 2,000 practices, while at the other end of the size spectrum establishments that have more than 500 employees have increased by more than 1,000 practices. The increasing number of establishments that exist within firms of more than 500 employees is an indication that the number of practices that are a part of a large consolidation has increased at a rate above all other firm sizes.

VETERINARY ESTABLISHMENTS (NUMBER OF EMPLOYEES), 2002-2013

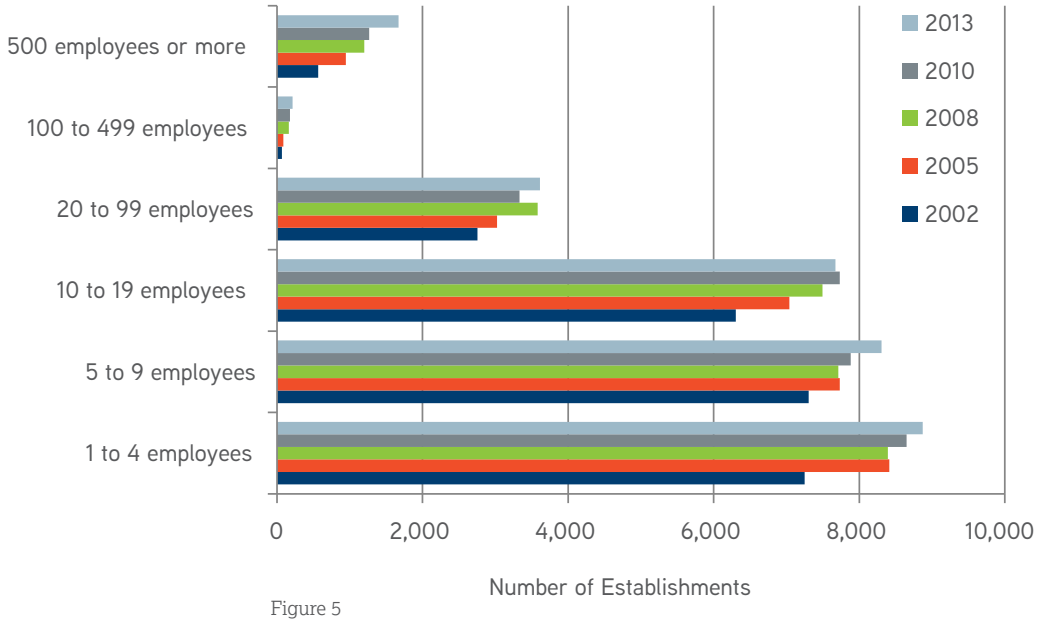


Figure 5

The growth in the number of firms that have multiple establishments — a sufficient multiple to obtain more than 500 employee — had no change over the 10-year period and remained at 16 firms throughout the period. The number of firms with multiple establishments to have 100 to 499 employees increased by 50 percent over the same period, however, rising from more than 50 to 76 firms.

VETERINARY FIRMS BY NUMBER OF EMPLOYEES, 2002-2013

Figure 6

The number and size of firms determines the structure of the industry. Increasing size of practices and declining numbers of practices suggests an increasing concentration or consolidation in the industry. A better measure of concentration, however, is the percent of the industry's output that is produced by the largest firms. More specifically, a common concentration index considers the share of the total market that is controlled by the four largest firms. But, a more specifically defined measure of concentration is the Herfindahl-Hirschman Index (HHI). The HHI is a commonly accepted measure of market concentration that is determined by taking the square of the market share of each firm competing in a market, and then summing the resulting numbers, and can range from close to zero to 10,000. If there was only one firm in the market (even if it had 10,000 establishments/practices) it would have a market share of 100 percent and the square of that would be 10,000, the most concentrated market possible – a monopoly.

The current concentration in private veterinary practice shows that approximately 20 percent of establishments account for 50 percent of industry output. But this includes all private practice types and does not consider firms. The number of firms in the industry is unknown but the largest of firms has about 1,000 practices while the smallest firm is a single-practice firm. There are many firms with one to five practices and most of these are owned by practicing veterinarians.

ECONOMIC IMPACT OF THE VETERINARY INDUSTRY

The market for veterinary services is a $33 billion industry made up of tens of thousands of firms, according to the IMPLAN model. Using IMPLAN data and software, this section looks at the composition of these firms, as well as their employment and output. Data for the IMPLAN software is captured from the U.S. Bureau of Economic Analysis, Bureau of Census, and Bureau of Labor Statistics (BLS). These data are used to summarize 536 sectors of the U.S. economy, both the outputs and the purchases of each of these sectors by geographic area.

The input-output account matrix provides information on the importance of the relationship between different industries within the economy. The relationship is typically presented in a form of multipliers showing the share of the rest of the industries from a one-dollar investment made by an industry, for example, the veterinary services industry. These multipliers enable the tracking of the effect of a change in the production of the veterinary services industry on the output of all industries that contribute to the production of the output of the veterinary services industry.

The willingness of pet owners to spend for veterinary services is but one contribution of the veterinary profession to the market as a whole — that is, to the economy-wide economic activity. Money spent at veterinary hospitals constitutes the direct impact of veterinary services on the economy (total revenue). To provide these services, however, veterinarians require supplies, equipment, pharmaceuticals, facilities and staff. These "inputs" to veterinary services are produced by other businesses, and the activity generated by these businesses to produce the inputs are known as the "indirect" impacts to the general economy.

Establishments according to the IMPLAN definition are not necessarily veterinary practices. This estimate includes establishments that may not necessarily be clinics, but rather could be animal control centers, animal shelters, veterinary-focused pharmaceutical companies, veterinary testing laboratories, and independent veterinary contractors, many of whom are relief veterinarians.

IMPLAN data provide, for every industry, the total number of employees, the industry labor income, the total proprietor income, and the total value of output. The employment, labor income and output associated with the industry of interest are called "direct effects." The multipliers enable determination of the "indirect" and "induced" effects. These terms refer to the changes that occur in other industries due to the change in the veterinary services industry. For instance, a change in the demand for veterinary services will cause the pharmaceutical industry to revise its production plan to meet the new demand in the veterinary industry. The changes in the pharmaceutical industry are captured in the indirect effects.

Finally, all of the people employed in the direct and indirect businesses spend money earned from these businesses. These expenditures for goods and services require additional labor. The sum of all of the goods and services purchased as a result of the expenditures of employees of veterinary hospitals, as well as those of businesses supplying inputs to the hospitals, produce what is termed an "induced" impact on the economy. The sum of the direct (veterinary hospital revenue), indirect (expenditures in related businesses) and induced (household expenditures from employees) impacts comprise the total economy-wide impact of veterinary practices.

For the veterinary services sector in the U. S. economy, the indirect and induced impacts of its services are $13.4 billion and $18.8 billion, respectively. Combining the direct, indirect and induced impacts, the total value of economic activity generated in the U.S. economy as a result of veterinary services in 2014 was $63.1 billion for an economic multiplier of roughly 2.1. To achieve this economy-wide impact required 729,089 employees in veterinary medicine and the supporting sectors, which, combined with the veterinary and veterinary-related businesses, provided federal, state and local taxes of $10.3 billion.

THE AVMA PET OWNERSHIP AND DEMOGRAPHIC STUDY

The number of pets has historically been determined every five years by the AVMA Pet Ownership and Demographic Survey (PDS). The first PDS was fielded in 1982 and the most recent PDS occurred in 2012. The PDS was again fielded this year (2017) and results from analysis of the data are being developed at the time of this writing and will be summarized in the *2018 AVMA Report on the Market for Veterinary Services*. The purpose of the PDS is "to serve the veterinary medical profession and all other individuals who need to make decisions about the health care and product marketing demands associated with the companion animal industry and ... to update and expand our knowledge about the companion animal population in the United States regarding demographic characteristics and use of veterinary medical services."

The specific objectives of the PDS are "to determine:

- populations of dogs, cats, birds, horses and other pets owned by U.S. households;
- household demographic characteristics associated with pet ownership; and
- frequency of times that pets were seen by a veterinarian and annual veterinary medical expenditures." (Wise, 1992)

Since the 1992 PDS, the national survey received roughly 50,000 respondents (47,000-60,000) and provided a national estimate of the number of pets of all types, frequency of visits to the veterinarian and the expenditure on veterinary services or products, and market size. Unfortunately, this information does not provide the data required to measure demand. The annual expenditure provided by a household is a single number of the total amount paid to veterinarians in the surveyed year, while demand is a set of quantities purchased or not purchased at each price by pet owners. And total market size is the number of customers (per year) including the pet owners who did not patronize a veterinarian during the year surveyed.

THE 2015 PILOT STUDY

At the end of 2015, in cooperation with the AVMA VED the National Center for Food and Agricultural Policy, an independent consulting group specializing in demand analysis, conducted a metropolitan market demand study to devise an accurate, low-cost household survey of single multi-county market areas for measuring the demand for veterinary services. This pilot study sought to determine a process for integrating smaller, metropolitan market-specific areas with the five-year PDS. These metropolitan market surveys would help to understand the difference in the relationship between the demands for veterinary services that may occur as a result of differing market demographics. A second objective is to provide a method for computing the annual changes to the national estimates of numbers of pets, number of veterinary visits by each pet, and the effect of price and income on the demand for specific veterinary services — and from whom the veterinary services were purchased.

One of the noteworthy findings in the 2015 pilot study is associated with the question on routine check-ups in the past 12 months. The 2012 PDS noted that approximately 20 percent of dog owners had not visited a veterinarian in the past 12 months. When provided more choices of where the canine pet might have received a routine check-up in the past 12 months, however, 80 percent of responding canine owners noted they had obtained a routine check-up in the last 12 months, in-line with the PDS estimate. However, another 13 percent indicated that they had received a routine check-up at an alternative to a traditional veterinary hospital or clinic. This calls into question the oft-quoted percent of pets not receiving annual care. This research, however, occurred in a small local market and thus might not extrapolate to the larger United States.

ROUTINE CHECK-UP FREQUENCY AND PROVIDER			
PDS versus Pilot Survey Q9	2012 PDS	Random Sample	Veterinary Clients
Exam, vaccinations obtained from vet in previous year?	81%		
Routine check-up (somewhere) in past 12 months?		92%	97%
Not this year		8%	3%
Not from a veterinarian	19%		
Pilot Q10a-h Where did you take Dog for routine check-ups (exam, vaccinations, etc)?			
Veterinary clinic or hospital		80%	82%
Shelter or humane society		1%	
City- or county-sponsored public clinic		1%	
Pet shop		1%	
Pet-focused retail store		4%	
Mobile facility or van		6%	11%
Other: vet who does house calls			4%

Table 3

The majority (83 percent) of dogs visit a veterinary practice one or two times a year with slightly more than half visiting only one time per year for a routine check-up. An interesting question to be asked of veterinarians is what is the total number of routine visits required per year to fulfill the health care guidelines set by the practice.

ROUTINE CHECK-UP VISITS LAST YEAR

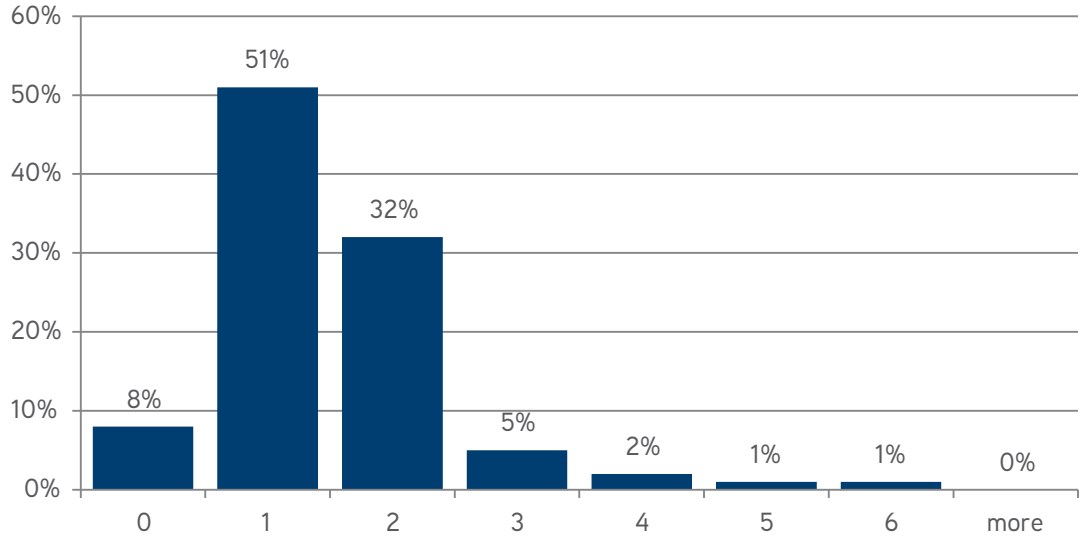


Figure 7

The respondents also reported the amount they spent for a routine check-up, and that information is provided in the figure below, separated by where the routine check-up was obtained. The variation in price paid per visit is large, running from zero to $500.

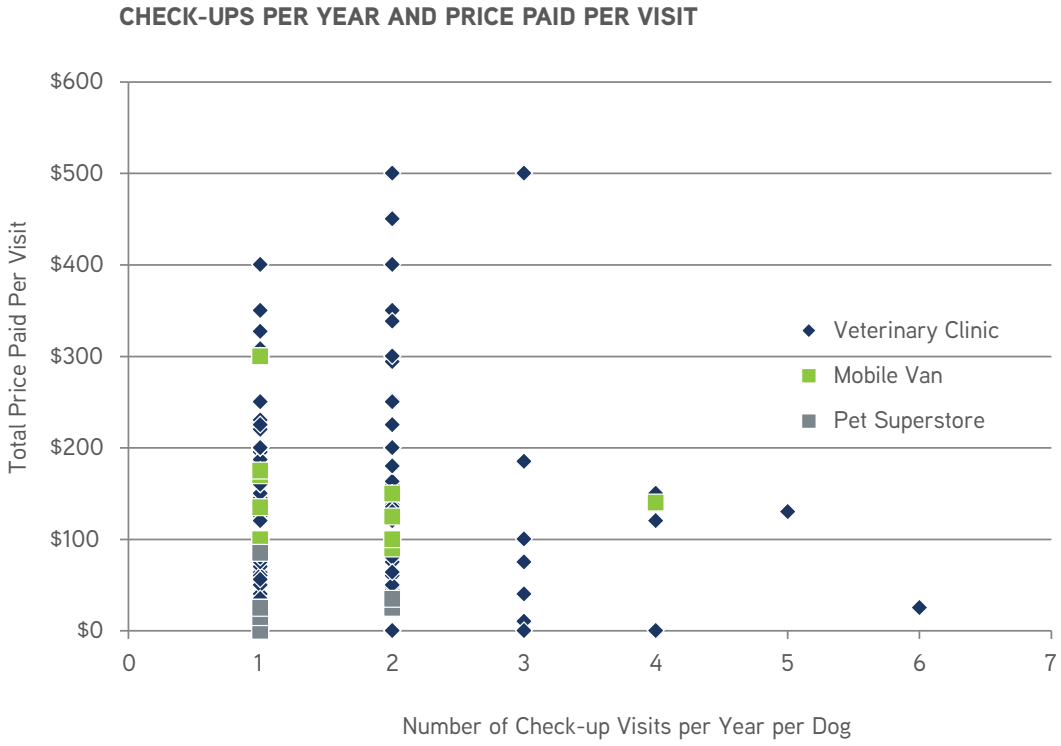


Figure 8

The number of visits and the price per visit can be organized in an accumulative distribution to produce a demand schedule, indicating how many routine dog check-ups could be provided at each price. Approximately 100 routine check-up visits would be purchased at a price of $200 per visit and 200 routine check-ups would be purchased at $100 per visit. In this specific market the demand for routine check-ups is inelastic (a large increase in price has little impact on quantity demanded) from $500 to $200 but becomes elastic (a change in price has a larger impact on the quantity demanded) after the price reaches $200.

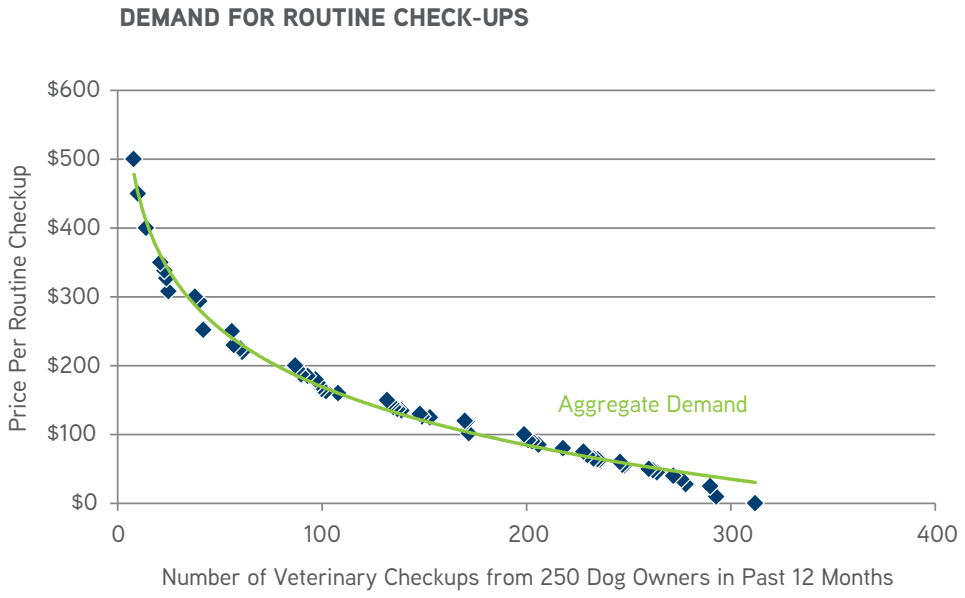


Figure 9

Plotting the amount of revenue (price of each routine check-up multiplied by the number of check-ups) that can be earned at each price illustrates the optimum price with which to maximize revenue. At $120 per routine check-up, the total revenue is maximized (not necessarily profit). An important question is whether the revenue-maximizing price is the same around the country or if it is unique to every market.

The importance of this finding is the demonstration that some price increases can improve financial performance while others will cause a decline in financial performance. But again, the factors internal to each practice, the culture and income of the clients and the type and size of pets could influence the revenue-maximizing price. In this example current prices for a routine check-up under $120 can be increased to improve financial performance of the practice while current prices above $120 that are increased will lead to a decline in financial performance.

This study should only be used as an example to indicate that consistently raising price may have negative impacts on practice financial performance. As price increases, the number of clients opting to purchase the service may decline. Initially, a decline in clients will not be sufficient to offset the increase in price and total revenue will increase. At some point, however, an additional increase in price will reduce the demand sufficiently to reduce total revenue.

MARKET REVENUE FROM ROUTINE CHECK-UPS OF 250 DOG OWNERS, 2015 PILOT SURVEY

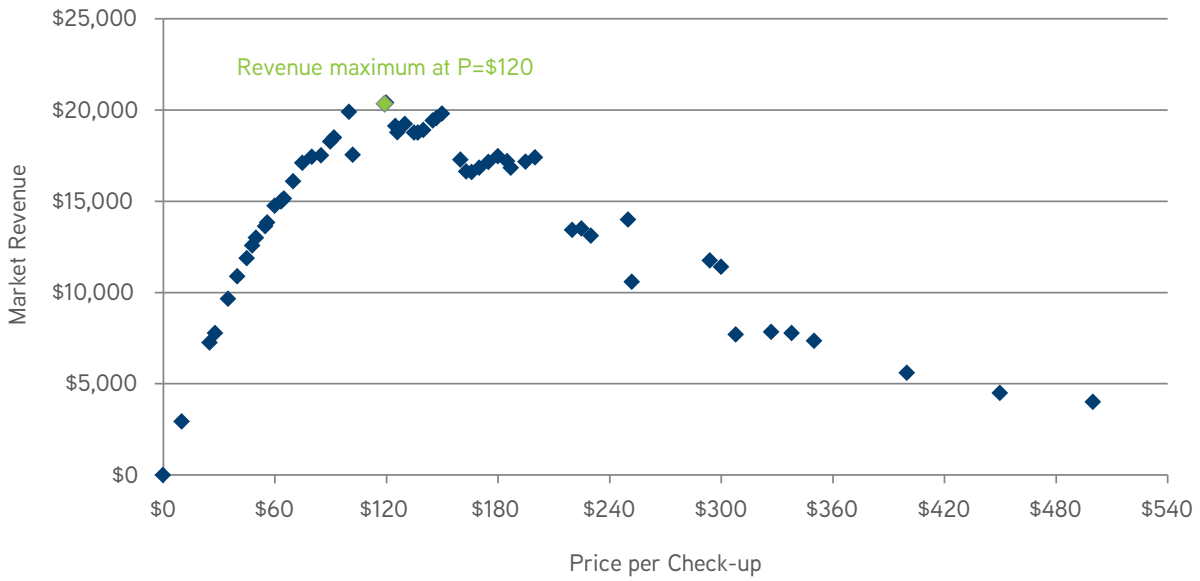


Figure 10

Determining the revenue-maximizing price for various services and the factors that create any variation in this price between locations will provide important information to veterinary practices about the impacts of price on the demand for veterinary services. Findings from the analysis of this 2017 Pet Ownership and Demographic Survey data were presented at the 2017 AVMA Economic Summit, and are scheduled to be published in early 2018.

THE 2017 PET OWNERSHIP AND DEMOGRAPHIC SURVEY (2017 PDS)

The 2017 PDS addresses some previously identified problems with the pet population estimates, and the more serious estimation problems about the veterinary care spending data. The potential challenges for these types of surveys include:

- ensuring that pet owners' demographic data are current;
- ensuring that the number of completed surveys exceeds 50,000;
- ensuring correct weights for more accurate pet population and pet ownership rate estimates;
- eliminating pet-owner bias in determining dog and cat body condition (underweight to obese);
- counting pet-months to more accurately estimate spending per pet, per year;
- counting pets with permanent IDs (tattoos or microchips);
- counting pets covered by "wellness plans" and pet health insurance;
- counting dogs that are primarily service or working dogs as opposed to "pets;"
- counting dogs and cats fixed by their current owner or before;
- identifying dog, cat, and horse owners spending more than $1,000 to treat a single health issue; and
- designing survey modules specific to dogs, cats, horses and other pets.

The Iowa State Survey Research Lab developed a sample frame that was able to ensure that the demographic information for households was obtained in 2017. This is an improvement over past surveys where the demographic data was secured at the time of enrollment in national survey pools.

The sample frame for the 2017 PDS was also expanded (more than triple past surveys) to ensure that the desired number of responses (completed surveys) was reached. This level of responses ensures a very small confidence interval around the estimate of the percent of households with pets, number of pets per household and level of expenditures on veterinary products and services.

PDS PRODUCTION, SAMPLE FRAMES, MODES AND SIZES

Edition	Survey By:	Sample Source	Mode	Sample Size	Completed Surveys
1983	Charles Research Group	NFO Research	paper	20,000	13,506
1988	Charles Research Group	NFO Research	paper	40,000	29,535
1992	CIM (AVMA)	NFO Research	paper	80,000	55,143
1997	CIM (AVMA)	NFO Research	paper	80,000	59,998
2002	CIM (AVMA)	NFO Research	paper	80,000	54,240
2007	Irwin Broh & Associates	TNS Custom Research	paper	80,000	47,842
2012	Irwin Broh & Associates	TNS Custom Research, Lightspeed MySurvey, ResearchNow, Federated	online	222,244	50,347
2017	National Center for Food and Agricultural Policy and Iowa State University	Survey Sampling International	online, mobile-friendly	TBA	41,622

Table 4

The 2017 PDS will also provide a more accurate picture of the body weight and condition of pets. Pet owners are thought to be biased in reporting their pets' weight: With obesity the new norm for pets, owners often make the mistake of accepting their animal's weight as normal even when the animal is overweight. In the 2012 PDS, 85 percent of the survey respondents thought their pet was the ideal weight, and only 13 percent thought their animal was overweight or obese, while the remaining 2 percent thought their animal was underweight.

In 2015, the Association for Pet Obesity Prevention (APOP) conducted a survey of veterinarians to gauge what veterinarians see in their practices regarding the body condition of pets. The APOP survey was designed exclusively for veterinarians concerned about the trends in weight gain for pets. The survey was conducted by having veterinarians visit the APOP website, log-in, and self-report the percent of their patients in each weight category. These veterinarians reported the same assessment as owners did in identifying pets that were underweight, but the similarities ended there. Veterinarians report only 44 percent of pets as having an ideal body weight, and 54 percent as being overweight — a full 41 percentage higher than the pet owners rate!

Both types of perceptions about body classification are important to ascertain and comprehend. The problem is that pet owners will almost always tend to under-report obesity. On the other hand, while veterinarians are highly trained to spot obesity in animals, the sample was created in a biased way — whereby only veterinarians who are interested in the subject would take the time to seek out and then complete the survey. So the survey may be over-represented by veterinarians who operate in areas where obesity may be a larger problem. These two types of biases will be inhibited in the future PDS and MMD surveys by using pictures of body shape, without associated wording (underweight, ideal, overweight, obese, etc.) in order to help guide survey respondents to provide more accurate answers.

CLASSIFICATION OF CANINE BODY CONDITION

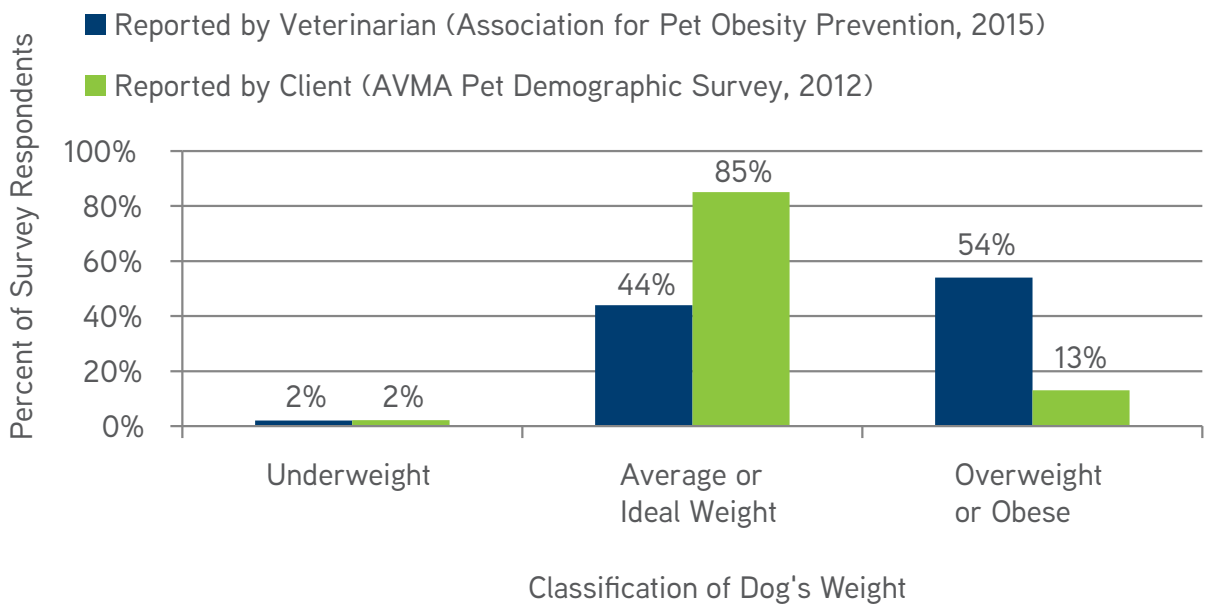


Figure 11

The new questions for the 2017 PDS will enable the calculation of price and income elasticities with a high level of accuracy. Previous studies have collected data on procedures purchased from veterinarians and the total amount paid for veterinary services in a year as well as in the last visit, but these values fail to give accurate enough information to be able to derive demand estimates.

The PDS will be annually updated using the Metro Market Demand Studies. Every year the AVMA will survey up to eight metropolitan markets to conduct more specific research about pet owners, test new questions, and annually update the PDS with statistics extrapolated from the metro areas to the nation as a whole. Additional results from the 2017 PDS will be shared in the *2018 AVMA Report on the Market for Veterinary Services*.

COMPARING U.S. PET POPULATION STATISTICS

Much has been made of the difference between the estimates detailed in the AVMA's U.S. Pet Ownership and Demographics Sourcebook (PDS) and those made in the American Pet Products Association's (APPA) National Pet Ownership Survey (NPOS). These differences may be the result of differences in sampling methodology and/or statistical definitions used in the surveys. The differences are classified into four categories and discussed in this section.

AVMA analysts have access to only the raw PDS survey data, and can calculate statistics as needed. Without access to the raw data from the APPA survey, however, it is difficult to attribute exact magnitudes to each of the differences listed below. Furthermore, because of copyright restrictions, it is not possible to publish re-creations of data from either of the sources, so instead the argument below must rely on proportional and percentage comparisons, rather than absolute comparisons.

When talking about pet populations, these figures are arrived at with a common formula. Noteably, the APPA NPOS "objective is to monitor consumer habits on an ongoing basis to identify short- and long-term trends, as well as new opportunities, in pet ownership and pet product and service consumption." (pg. xvi) The AVMA PDS objective is to create "...the largest, most statistically accurate and complete survey of the pet owning public and pet population demographics."

Margin of Error

All statistics are subject to variability, so the first potential difference in survey results is simple statistical noise. That is, there is a difference in means between two samples simply because each sample is comprised of independent observations. The greater the sample size, the more likely the means are to be equal. Standard deviations are typically reported with statistical publications so that the reader is able to evaluate the probability that the mean value is the correct value. The NPOS does not provide any standard deviations in the tables, except for binomial probabilities, but the standard deviations from the AVMA data are used to approximate those in the NPOS. Table 5 provides the comparable statistics from the AVMA PDS and the APPA NPOS.

MEAN NUMBER OF PETS PER HOUSEHOLD		
	AVMA, 2011	APPA, 2010-2012
Sample Sizes		
Total	**50,347**	**25,109**
Dogs	20,604	527
Cats	16,401	461
Birds	1,762	299
Mean Number of Pets per Household		
Dogs	1.52	1.47
Cats	1.97	2.11
Birds	2.15	2.98
Standard Deviation of Mean Number of Pets per Household		
Dogs	1.17	1.43
Cats	2.15	2.42
Birds	4.40	4.88
Margin of Error, 95% confidence*, Mean Number of Pets per Household		
Dogs	0.02	0.12
Cats	0.03	0.22
Birds	0.21	0.55
Confidence Intervals around Mean Number of Pets per Household*		
Dogs	(1.50,1.53)	(1.35,1.59)
Cats	(1.94,2.00)	(1.89,2.33)
Birds	(1.95,2.36)	(2.43,3.53)

Table 5

As shown in Tables 5 and 6, means and confidence intervals can be compared across the surveys. The confidence intervals for the two survey samples overlap for dogs and cats but not for birds. This estimated result indicates that there is no statistical difference between the mean number of dogs and cats per household. Note that the confidence interval for dogs and cats from the PDS fits inside the confidence interval for the NPOS. Thus, it is likely that both the sample size difference and statistical noise could explain the small difference in means between the NPOS and PDS for the number of dogs and cats per households. However, for birds there is no overlap between the mean estimates and the opposing confidence intervals and thus sample size and statistical noise are unlikely to be able to explain the differences in these mean numbers of animals per household.

For the percent of households that have pets the statistical difference between the PDS and NPOS is a different story. The NPOS sample is half the size of the PDS and the confidence intervals do not overlap. This indicates that neither the sample size nor the statistical noise can explain the differences and other factors must be considered.

DO YOU OWN A PET?		
	AVMA, 2011	APPA, 2010-2012
Sample Sizes		
Total	50,347	25,109
Do You Own a Pet? (Percent answering "Yes")		
Dogs	36.28%	46.70%
Cats	31.08%	37.30%
Birds	3.21%	5.70%
Standard Deviation of Do You Own a Pet		
Dogs	48%	50%
Cats	46%	48%
Birds	18%	23%
Margin of Error, 95% confidence*, of Do You Own a Pet		
Dogs	0.42%	0.62%
Cats	0.40%	0.60%
Birds	0.15%	0.29%
Confidence Intervals of Do You Own a Pet		
Dogs	(35.86%, 36.70%)	(46.08%, 47.32%)
Cats	(30.67%, 31.48%)	(36.70%, 37.90%)
Birds	(3.06%, 3.36%)	(5.41%, 5.99%)

Table 6

STANDARD DEVIATIONS ARE TYPICALLY REPORTED WITH STATISTICAL PUBLICATIONS SO THAT THE READER IS ABLE TO EVALUATE THE PROBABILITY THAT THE MEAN VALUE IS THE CORRECT VALUE.

TIMING

One such other factor to consider is illustrated by the length of time to which that the question about pet ownership refers. The APPA publishes its questionnaires in full. The first, or screener, questionnaire asks in the beginning, "If you do not currently have a pet in your household but had one in your household in the past two years, please respond to the following questions as if you currently had that/those pets in your household." (APPA pg. 59).

The 2013-2014 APPA survey was conducted online in 2012 (pg. xvi), whereas previous versions were administered in July through the mail. This section of the report compares the 2012 AVMA PDS, which describes pet ownership trends in the calendar year 2011, with the 2013-2014 APPA NPOS, which was conducted in 2012 and describes pet ownership trends from 2010-2012. This then is a comparison of the pet populations quoted in the APPA's NPOS publication as two-year averages with the statistics quoted in the AVMA's PDS pet populations on a single day, December 31st. Specifically, the 2012 Pet Ownership and Demographic Sourcebook states, on page 174:

"In this publication, there were two measurements used when extrapolating findings to the entire U.S. population. For statistics that involve pet and owner populations, households that owned animals on December 31 were used in calculations. However, to determine expenditures and utilization of services for the entire year, households that owned pets anytime during the year were used in calculations."

WITHIN SAMPLE DIFFERENCES OF PET POPULATIONS, 2011 PDS

		Dog	Cat	Bird	Horse
Respondents with at least one animal	Anytime in 2011	20,604	16,401	1,762	774
	December 31, 2011	18,266	15,646	1,616	708
	Difference	12.8%	4.8%	9.0%	9.3%
Total count of animals from survey respondents	Anytime in 2011	31,661	35,216	4,271	2,132
	December 31, 2011	29,147	32,306	3,796	1,898
	Difference	8.6%	9.0%	12.5%	12.3%

Table 7

This is a statistical relic of the way that the sampling is conducted: All households that owned a pet are counted in the first number (the total for the year), but the second number (December 31st), will always, inevitably be less because households lose animals throughout the year, and not all of them replace those animals before the end of the year. Even if a household did replace a deceased or lost pet, the statistics would be different because that household would report owning two animals during the year, but only one at the end of the year.

A lot can be different on December 31st compared to the rest of the year. Pets are given away to family members and shelters, and some pets die. Some bitches give birth to a litter, only to have some puppies of that litter given away. Students go off to college and leave their pets at home. There are many reasons why animals that may have been present in an individual's household at any point in a year are subsequently not present in the household at the end of the year. Comparing AVMA's estimates, in 2011 there were 74.1 million households who owned pets at any time that year, but as of December 31, 2011, that number dropped to 66.5 million, a 10.3 percent intra-year decline.

Whatever the case may be, a population of any kind changes over time, and a population count should be conducted in such a time as the population does not have enough time to change in a statistically relevant way during the period of time captured in the snapshot. For example, a respondent in the survey claimed to have had 25 dogs throughout the year, but as of December 31, 2011, had exactly 15 dogs. Losing 10 of one's dogs in a year to death is possible, but not likely. More likely, it could indicate that this person was a foster parent to shelter animals, and found homes for 10 dogs in the course of 2011.

Although only one question within the survey was asked to determine the difference between the number of pets owned during a two-year period (NPOS) and a one-year period (PDS), the large difference in the number of pets estimated during a year and for a single day suggests that a two-year estimate would produce a larger number of pets per household than would a one-year estimate.

POPULATION REPRESENTATION OF SAMPLE

The PDS and APPA are somewhat comparable in total sample size. The 2012 PDS had a sample size of 222,244, receiving 50,347 responses. The NPOS was sent to 50,000 individuals and received 25,109 responses (pg xvi). When responses number in the tens of thousands, these levels of responses are perfectly comparable to one another. To be analogous, however, the sample must represent the population with respect to the demographic characteristics that affect pet ownership. Even if the sample is selected to represent the population, the responses are unlikely to perfectly match the population characteristics and will need to be reweighted by the important demographic factors.

The NPOS survey study authors contend, "The panel of pet owners is representative of all pet owners in the U.S." However, this is not possible to know apriori, as one of the objectives of doing the survey is to identify the factors that influence pet ownership. More specifically, one objective of the survey is to estimate the relationship between various demographic characteristics and pet ownership. It could be the case that the sample was selected to be representative of the U.S. population in measured variables, but it's impossible to know about the variables being measured, in this case, pet ownership statistics.

Second, those sample returns are only for the statistics measuring pet populations. A follow-up survey sent out to NPOS respondents asked detailed questions about pets in eight categories: dog, cat, freshwater fish, saltwater fish, bird, small animal, reptile and equine. These follow-up surveys had similarly high response rates, from approximately 50 percent to 80 percent. However, the problem is that the total number of returns for all eight categories was 2,739. Contrast this to the AVMA survey which had 19,211 responses from dog owners, 16,409 responses from cat owners, and 1,762 responses from bird owners. In total, this is a more than ten-fold difference in useable responses.

BACKYARD POULTRY AND THE PET BIRD POPULATION

Of course, not all pets are dogs and cats. The resurgence of backyard poultry represents a popular movement in the United States. The AVMA PDS tracks "Poultry (pets) in a separate category from "Birds," and though households with birds in the PDS outnumber households with poultry by about three to one, the total number of poultry outnumbers birds by about 50 percent. The NPOS survey, however, does not have a category for poultry. That some poultry owners in the NPOS survey classified their animals as "Birds" (and the rest as "Other") is plausible, though it is impossible to know how many without having the raw data. Thus, the use of only the generic "bird" as a pet category may inflate the number of bird-owning households.

Indeed, the PDS indicates that 439 respondents, or just under 0.9 percent of survey respondents, reported owning poultry on December 31, 2011 (or 494, 1 percent at any time in 2011). The average number of poultry for these 439 households is 12.3, with a standard deviation of 13.6. The NPOS does not report on the statistics for the "Other" category, so it is unknown how they compare. Because backyard poultry flocks are large relative to the average number of caged birds per household, this would drive up the average number of animals per household.

One more key piece here is that the species of birds kept by respondents to the NPOS are known, as these are listed in the publication; 93 percent of the survey respondents selected of the common household species listed, and 7 percent selected "Other species of bird," which would seem to put a cap on the maximum number of poultry owners. The NPOS, however, has a two-stage sampling process. The respondents may have taken the screener survey first, where the proportion of pet-owning households is counted, and then some were offered a detailed follow-up survey. The follow-up survey asked about the species of bird. Some of the respondents with backyard poultry may have continued on with the survey and answered questions appropriately (accounting for at least part of that 7 percent of other birds), while others may have been discouraged by the questions, recognizing that the questions were designed for caged or house birds. The conflation of poultry flock size with household bird pets inflates the number of birds per household.

When counting households with animals, the APPA survey requests, "Please indicate from the list below the type(s) of animal(s) you own." "Bird" and "Other Animal" are listed among the options. On the other hand, the AVMA survey asks, "Which of the following pets did your household own at any time in 2011?," with "Birds" and "Poultry (pets)" both listed among the options. A 2014 study in *Poultry Science* indicated that 57 percent of backyard poultry owners consider their flocks to be pets (Elkhoraibi, et al. 2014). Together this suggests that the APPA survey may be picking up both poultry flocks considered pets as well as poultry flocks considered revenue-generating or food-generating property. This difference in definition between "own" and "pet" inflates the number of bird-owning households.

For argument's sake, let's suppose all 7 percent of those in the "Other" category had backyard poultry, at the PDS average of 12.3 birds per flock. Then to arrive at the overall average of 2.98 birds per household would require the other 93 percent of respondents to own an average of 2.32 birds per household, which is inside the 95 percent confidence interval obtained from the PDS.

Lacking the APPA's NPOS raw data, these differences can't be quantified without making assumptions. So, let's assume the distribution of poultry owners in the APPA survey is the same as in the AVMA survey, in order to estimate the number of non-poultry, pet birds. The PDS found 3.7 million households with birds and 1.02 million households with poultry (pets) while the NPOS found 6.9 million households with birds. The PDS also estimated 2.3 birds per household and 12.3 poultry per household, while the NPOS estimated 2.98 birds per household. Within the estimates of households with birds and number of birds per household, the PDS estimated 20.9 million birds in households while the NPOS estimated 20.6 million, a negligible difference.

BIRDS AND BACKYARD POULTRY ESTIMATES		
	AVMA, 2011	APPA, 2010-2012
Number of Households with Birds		
Birds	3,700,000	6,900,000
Poultry (Pets)	1,020,000	n/a
Total Households	4,720,000	6,900,000
Number of Animals per Household if Birds are Present		
Birds	2.3	2.98
Poultry (Pets)	12.3	n/a
Average Birds per Household	4.5	2.98
Total Estimated Bird Population		
Birds	8,300,000	20,600,000
Poultry (Pets)	12,591,000	n/a
Total Bird Population	20,891,000	20,600,000

Table 8

SAMPLE STRATIFICATION AND POST-SURVEY WEIGHTING

Statistics in the APPA's NPOS are not weighted according to the population, but rather according to the sample. There is simply a statement that says, "Ipsos has also developed a special panel balancing system for outgoing sample…This provides a more balanced returned sample and lessens or eliminates the need to weight the data." (pg. xvi). What the study authors describe is a system of sample stratification based on demographic variables. Survey samples are often created in this way. The problem, however, is that the approach assumes that the response variable (pet ownership) is not correlated with the factors on which the stratification is conducted. There is no indication that the survey results were checked or reweighted when the national statistics were created.

Contrast this with the 2012 Pet Ownership and Demographic Sourcebook: "The sample was selected with respect to the following characteristics: U.S. Census region, income, household size, age of head of household, family versus non-family, and population density (Table A-7). For 2012, the respondent data was weighted by the following six characteristics to correctly represent the demographic composition of the U.S." (pg. 177).

Without the complete raw data, it is impossible to say exactly how much weighting is affecting the difference in the results. However, one indication was seen in the 2016 AVMA Metro Market Demand Survey. In that survey, even with an appropriately stratified sample, failure to weight statistics based on demographic characteristics would result in estimates of canine ownership between 13 and 34 percent (or about 6-17 *percentage points*) higher than the true proportion.

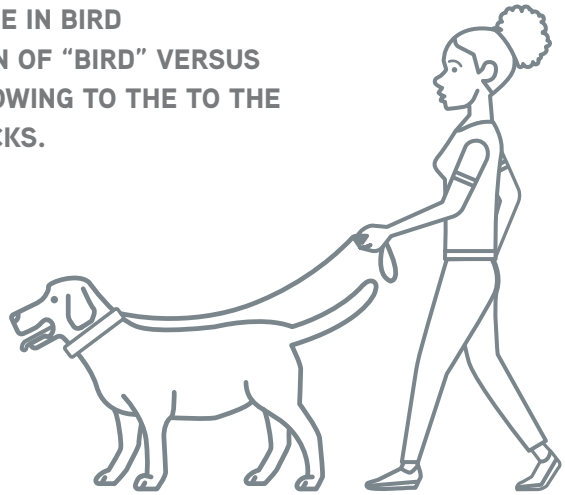
2016 AVMA METRO MARKET DEMAND SURVEY, PERCENT OF HOUSEHOLDS OWNING DOGS

	Philadelphia CSA	Los Angeles CSA
Raw, Unweighted	51%	58%
Weighted	45%	41%
Difference	13%	34%

Table 9

The difference in estimates between the APPA's NPOS and AVMA's PDS surveys can probably be attributed to three primary sources: definition of population (due to timing of the survey), post-survey weighting of final statistics, and the two-stage screener-module surveying procedure. The vast majority of the difference in bird populations may be due to the definition of "bird" versus "poultry" and "own" versus "pet," owing to the presence of backyard poultry flocks.

THE VAST MAJORITY OF THE DIFFERENCE IN BIRD POPULATIONS IS DUE TO THE DEFINITION OF "BIRD" VERSUS "POULTRY" AND "OWN" VERSUS "PET," OWING TO THE TO THE PRESENCE OF BACKYARD POULTRY FLOCKS.



PROFESSIONAL SEGMENTS

An increase in the demand for meat or dairy products affects the market for bovine veterinary services.

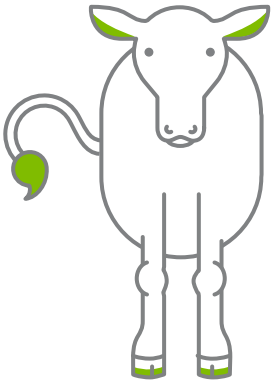
BOVINE VETERINARY SERVICES

In 2015 the AVMA worked with the American Association of Bovine Practitioners (AABP) to survey the latter's membership in order to better understand some of the unique aspects of the veterinary markets that affect bovine veterinarians. Data were collected from 455 AABP veterinarians on topics as diverse as employment, hours worked, income, ownership, educational debt, and practice revenue. This section of the report focuses on the statistics from bovine veterinary practice owners. The full report can be obtained from the AABP or the AVMA.

The bovine practice financial performance depends on the overall condition of the national economy and, more specifically, the economic conditions in the animal protein production sector. An increase in the demand for meat or dairy products affects the market for bovine veterinary services. A downturn in the economy leads to a contraction in household demand for animal protein, reducing food animal production and the demand from animal producers for all inputs, including veterinary services. The result is lower financial performance of bovine veterinary practices. Also found is that bovine veterinary practices, as with the other veterinary practice types, are highly affected by the general economy's performance. An improvement in the national economy might not be beneficial in all regions or for all practices, however, and some regions might benefit more than others.

Bovine Practice Characteristics

According to the survey, the most common practice setup for bovine veterinarians is to provide ambulatory services only, at 61 percent of the respondents. The next most common type is to provide both ambulatory and haul-in services, at 30 percent of the sample.



DISTRIBUTION OF VETERINARIANS BY TYPE OF BOVINE PRACTICE

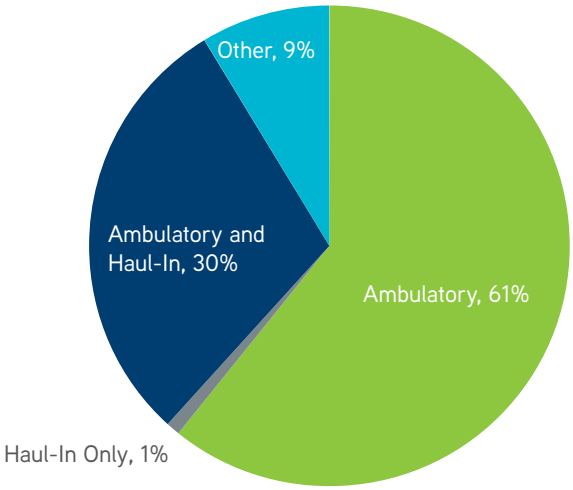


Figure 12

Given that more than 90 percent of the sample AABP members' practices offer ambulatory services, a natural follow-up question focuses on the amount of time spent on an average call. The following figure shows that a majority of respondents, 62 percent, spend an average of one hour or less on a typical call. However, 22 percent of respondents reported spending more than an hour and a half on an average call. The longer call times may be reflective of seeing more animals per visit, of spending more time in transit, or providing more services per animal on each visit.

AVERAGE TIME SPENT DURING A TYPICAL CALL

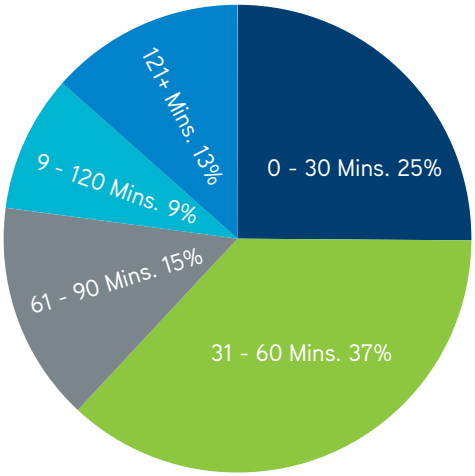
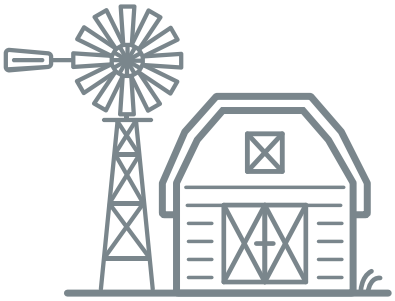


Figure 13



THE LONGER CALL TIMES MAY BE REFLECTIVE OF SEEING MORE ANIMALS PER VISIT, OF SPENDING MORE TIME IN TRANSIT, OR PROVIDING MORE SERVICES PER ANIMAL ON EACH VISIT.

Because of the variety of methods used to bill clients based on time and distance, the more insightful question would be to ask what percent of time is actually spent providing services, rather than, for example, driving, or performing administrative tasks.

Nearly half of respondents, 47 percent, say that they spend from 75 to 100 percent of their time performing billable work for clients, and 75 percent of respondents spend at least half of their time performing billable work.

DISTRIBUTION OF RESPONDENTS BY PERCENT OF TIME SPENT ON PROVIDING BILLABLE SERVICES

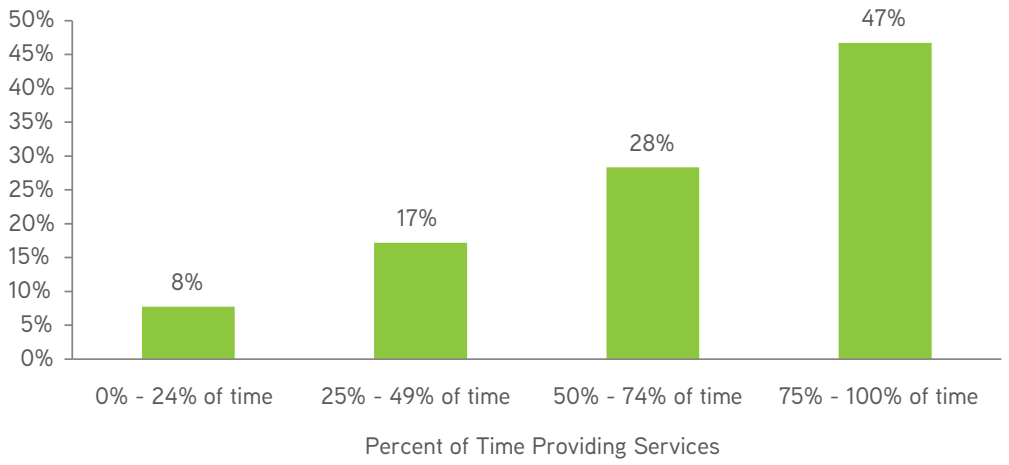


Figure 14

Members of AABP serve a diverse group of animals. The following table displays the percent of revenue associated with each of the following types of animals. The bovine categories clearly dominate revenue in the table below, as 30 percent of the respondents indicated that 76 percent-100 percent of their revenue is from veterinary products and services associated with dairy animals and 5 percent of respondents obtain 76 percent-100 percent of revenue from cow-calf products and services. Small ruminant, swine, equine and, in particular, companion animals, however, also comprise a share of the revenue of AABP member-owned veterinary practices.

PERCENTAGE OF PRACTICE REVENUE BY TYPE OF ANIMAL

	0%	1% - 10%	11% - 25%	26% - 50%	51% - 75%	76% - 100%
Dairy	15%	21%	8%	12%	15%	30%
Cow-calf	9%	40%	21%	16%	9%	5%
Feedlot	44%	40%	11%	4%	1%	1%
Stocker	41%	42%	10%	5%	2%	0%
Small Ruminant	15%	72%	8%	4%	1%	0%
Swine	37%	55%	5%	2%	1%	0%
Equine	21%	51%	17%	7%	3%	1%
Companion Animal	23%	19%	14%	20%	18%	6%

Table 10

Bovine practice owners were asked to indicate the percent of revenue that was obtained by category of services. Some 74.3 percent of practices noted that service call fees, the charge for taking a trip to an animal owner's farm, amounts to less than 10 percent of the gross revenue of the practice. On the other hand, 11.5 percent of practices indicated that 41 percent-50 percent of the practices' revenue was obtained through the provision of reproductive services.

Results from the AVMA's 2012 Biennial Economic Survey indicated that in 2011 food animal exclusive and food animal predominant practices (though not necessarily AABP member practices) derived a mean of about 24 percent of their revenue from the sale of prescription drugs. The current AABP survey indicates this number may have dropped, as 70 percent of respondents claimed to derive 20 percent or less of their revenue from all product sales, not just prescription medications, with a mean of 17 percent.

PERCENTAGE OF REVENUE BY TYPE OF ACTIVITY										
	< 10%	11% - 20%	21% - 30%	31%- 40%	41% - 50%	51% - 60%	61% - 70%	71% - 80%	81% - 90%	91% - 100%
Call Fees	74.3%	20.7%	2.3%	0.7%	1.0%	0.7%	0.3%	-	-	-
Reproduction services	24.8%	18.3%	19.2%	13.3%	11.5%	5.3%	3.4%	1.9%	2.5%	-
Individual sick animal	51.6%	29.6%	12.1%	4.8%	1.0%	0.6%	0.3%	-	-	-
Surgery	65.6%	23.8%	7.4%	2.0%	1.0%	0.3%	-	-	-	-
Technician-generated	94.3%	4.6%	1.1%	-	-	-	-	-	-	-
Protocol development consultation	94.8%	3.3%	0.7%	-	0.7%	-	-	-	0.7%	-
Consultation, other	33.9%	54.3%	4.3%	-	1.6%	0.8%	0.4%	0.8%	0.8%	3.2%
Sale of products	45.4%	25.0%	15.1%	6.7%	3.9%	1.8%	1.1%	0.7%	0.4%	-
Radiology	92.2%	5.9%	2.0%	-	-	-	-	-	-	-
Preventive medicine	59.9%	17.4%	12.6%	4.8%	2.4%	0.7%	1.0%	1.0%	0.3%	-
Embryo transfer	70.2%	6.4%	6.4%	2.1%	2.1%	4.3%	-	2.1%	2.1%	4.3%
Laboratory, diagnostics	94.0%	4.7%	0.9%	0.4%	-	-	-	-	-	-
Other revenues	61.5%	7.7%	1.9%	-	3.9%	1.9%	-	-	1.9%	21.2%

Table 11

PARALLEL SERVICE PROVIDERS

Like many types of veterinarians, bovine veterinarians are interested in learning about competition from non-veterinary service providers. In particular, bovine veterinarians have communicated that they are particularly concerned that their role in providing animal services is being reduced to the provision of medical emergencies.

There are many types of non-veterinarian providers of services, such as pharmaceuticals, parasiticides, antibiotics, reproductive services, ultrasound imaging and nutritional services that were once deemed the sole market of veterinarians. These non-veterinarian providers of veterinary services are referred to as parallel providers. Because of the potential effects of parallel veterinary service providers on not only the revenues of practices and incomes of veterinarians, but the very existence of bovine practices in some rural areas, bovine veterinarians were asked to identify the potential competitors who have adversely affected their practices. More than 60 percent of the respondents claim that parallel providers have taken business from them.

Particularly with very large cattle operations, producers may find it worthwhile to hire a full-time employee to administer many of the vaccines and services that have generally been reserved for veterinarians. Bovine veterinarians, in turn, have been increasingly relegated to a smaller role in the health care of bovines and other types of animals.

Only 15.3 percent of the respondents said they have never been affected by any of the parallel service providers listed in Figure 15. The primary types of parallel services provider that affects bovine veterinarians consists of route trucks that deliver supplies to farms (52 percent) and non-licensed veterinary service providers (50 percent). Consultant veterinarians who visit farms once a year are also listed as potential threats to bovine veterinary practices.

PARALLEL VETERINARY SERVICE PROVIDERS AND THEIR IMPACT ON BOVINE VETERINARIANS' PRACTICES

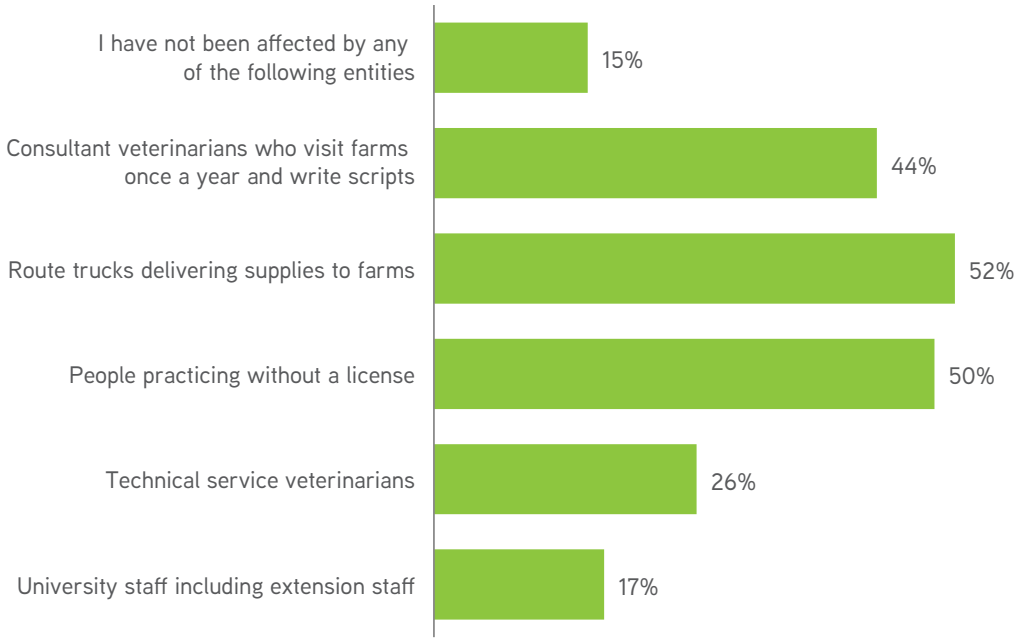


Figure 15

Of those respondents who said they are being affected by parallel providers, the majority (50.4 percent) claim that they are losing between 11 and 50 clients each year because of the competition.

MORE THAN 60 PERCENT OF THE RESPONDENTS CLAIM THAT PARALLEL PROVIDERS HAVE TAKEN BUSINESS FROM THEM.

NUMBER OF CLIENTS LOST BECAUSE OF NON-VETERINARIAN ANIMAL SERVICE PROVIDERS

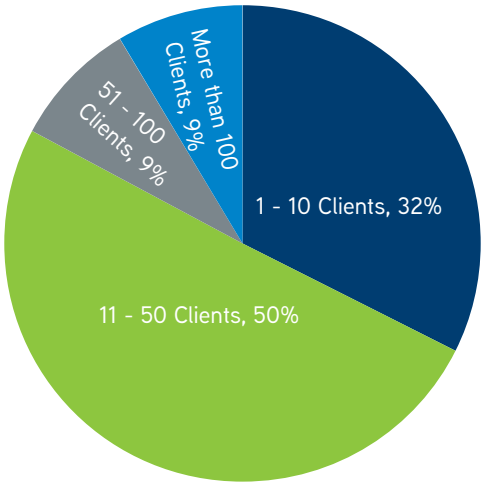


Figure 16

Respondents were also asked to estimate how many head of animals they are not servicing as a result of parallel providers of veterinary services. For instance, 40 percent of those being affected indicated that each year they are not seeing between 100 and 500 head of dairy cows as a result of activities of parallel providers (Figure 17). Between 15 and 20 percent lose approximately the same number of cow-calf pairs each year.

NUMBER OF ANIMALS NOT SEEING BECAUSE OF NON-VETERINARIAN ANIMAL SERVICE PROVIDERS

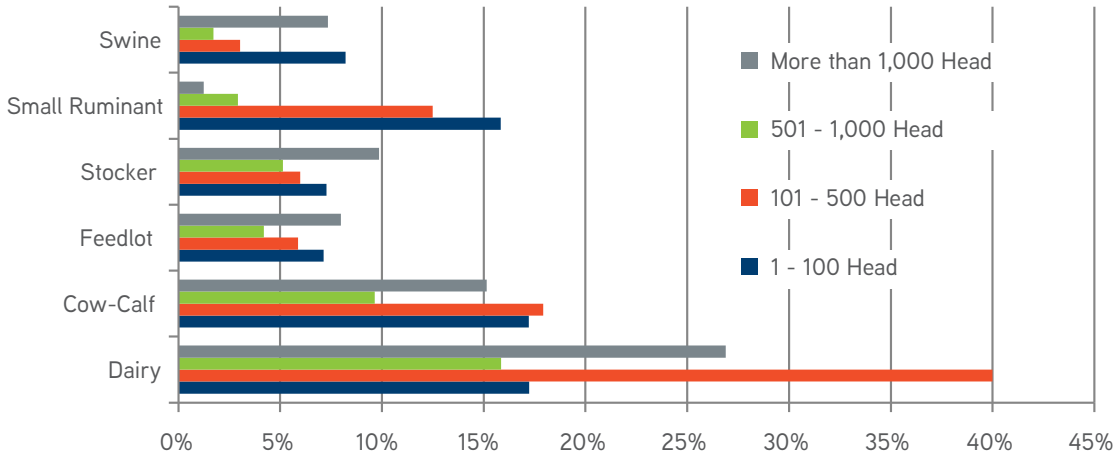


Figure 17

The bovine veterinarians were asked about the gross revenues of the practice to determine whether bovine veterinary practices have expanded or contracted over the last five years. Of those who responded, 55.3 percent said that their practice revenue has stayed constant during the last five years, 14.9 percent report that their revenue has declined, while 29.8 percent expressed that revenue had increased.

CHANGE IN PRACTICE REVENUE DURING THE LAST FIVE YEARS

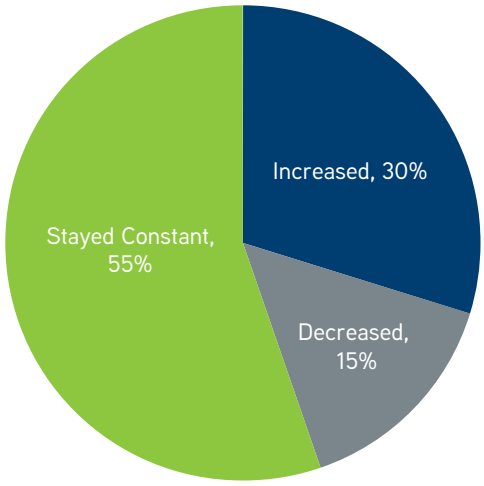


Figure 18

TODAY, ROUGHLY 440,000 FARMS PRODUCE 85 PERCENT OF ALL U.S. AGRICULTURAL OUTPUT AND THIS IS DOWN FROM NEARLY 6 MILLION FARMS IN THE 1930s.

Of those who have experienced an increase in their gross revenue, 47.2 percent said the increase in revenue was between 1 percent and 10 percent (Figure 19). Roughly one-fifth have seen an increase of 20 percent or more during the last five years.

RATE OF INCREASE IN LOST PRACTICE GROSS REVENUE IN PREVIOUS FIVE YEARS

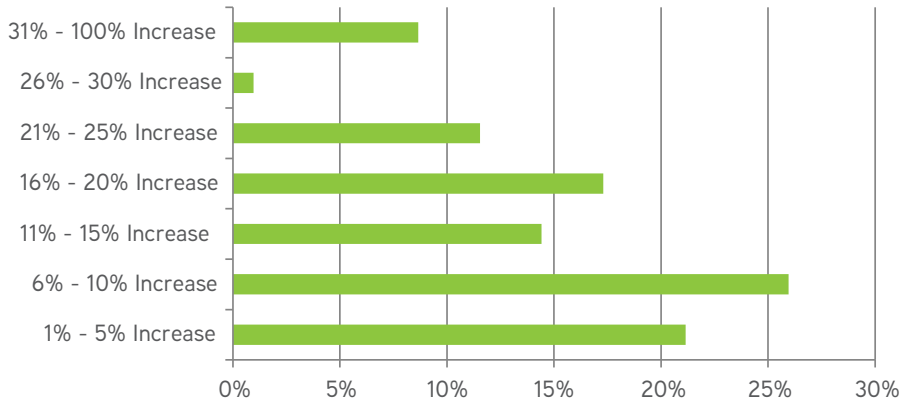


Figure 19

Besides parallel services providers, another factor that might affect food animal and rural veterinary salaries is one that is known to have an adverse impact on local businesses and economies throughout rural America. Today, roughly 440,000 farms produce 85 percent of all U.S. agricultural output and this is down from nearly 6 million farms in the 1930s. This increasing concentration in agricultural production has enabled large farms to buy inputs in bulk at lower prices from central markets (pecuniary economies) rather than local markets, a change that has trimmed rural communities' of population and supporting businesses.

The fewer and larger food animal producers are often of a sufficient size to have employees who perform reproductive services, vaccinations, deworming and parasite control and other services that smaller operations once purchased exclusively from the local veterinarian. While these large operations continue to need emergency veterinary medical services, there is often an insufficient quantity of these services demanded to enable a veterinary business to locate in a small community and be economically viable. Many of the small farms belong to retirement or lifestyle owners who have not engaged in production agriculture as a profession and typically need more services per animal to assist with their production activities than do the professional producers. To this extent, the demand for veterinary services may be tied to the average herd size in a business area and the hypothesis is that the larger the herd size, the fewer the services per animal.

Table 12 displays the results of a regression analysis that sheds light on the effect of herd size on the income of bovine veterinarians. This estimated equation includes standard variables that are known to be correlated with veterinarian incomes, including variables on demographics and work characteristics. The estimated equation also includes variables of particular interest to bovine veterinarians, such as the number of minutes spent per call, the number of non-veterinarian service providers in the area, and the estimate of herd size elicited from the survey respondents.

The variables of interest are those measuring the number of animals: population of dairy cows, population of cow-calves, population of stockers, population in feedlots, and population of small ruminants. At the 10 percent level of significance, each of these variables, except the population of small ruminants, is statistically significantly associated with bovine veterinarians' income. Larger herds of dairy cows, cow-calves and feedlot animals tend to increase veterinary compensation, while larger herds of stockers tend to decrease compensation.

These findings fail to lend evidence to the hypothesis that larger herd sizes are associated with fewer veterinary services provided per animal. Larger numbers of animals in the business area are associated with increases in income, with the exception of stocker cattle. The data did not allow for a determination of variations in services per animal with changing herd sizes. Also, recall that a veterinarian's average call time may be higher than that of another because the number of services per animal is higher, the number of animals treated is greater, or the distance travelled is further. This regression shows that there is no discernable relationship between the average number of minutes per call and income.

Also important in this income regression are the number of years of experience and gender. AABP district, board certification, number of minutes spent on a call, and the number of competing non-veterinary service providers had no statistically significant impact on income. Male bovine veterinarians tend to make about 77 percent more than female bovine veterinarians. Also, consistent with trends in other professions, income generally increases with the number of years of experience, up to a maximum at 28 years of experience, and then slowly declines after that point.

EFFECT OF HERD SIZE ON BOVINE VETERINARIANS' INCOME				
Variable	% Change*	Parameter Estimate	Std. Error	Pr > |t|
Intercept		9.55034	0.68641	0.00010
Number of years since DVM (1)	2.80360%	0.02765	0.01174	0.02030
Quadratic term of (1)	-0.04920%	-0.00049	0.00023	0.03500
Log (# of Hours per week)		0.32464	0.16236	0.04810
Respondent is board Certified (YES = 1)		-0.30248	0.26139	0.24980
Gender (Male = 1, Female = 0)	77.05670%	0.57130	0.14406	0.00010
Log (# of minutes per call)		0.04859	0.06436	0.45200
Log (# of non-vet service providers)		0.00636	0.03712	0.86420
Population of dairy cows in the area	0.00010%	0.00000	0.00000	0.05470
Population of cow-calf in the area	0.00040%	0.00000	0.00000	0.01700
Population of stocker in the area	-0.00100%	-0.00001	0.00001	0.05360
Population of feedlot in the area	0.00000%	0.00000	0.00000	0.01830
Population of small ruminants in the area		-0.00001	0.00001	0.11100
District 2		-0.10556	0.18998	0.57960
District 3		-0.38251	0.23419	0.10530
District 4		-0.18083	0.18760	0.33730
District 5		-0.08718	0.15278	0.56940
District 6		-0.05544	0.18407	0.76380
District 7		-0.24673	0.21570	0.25520
District 8		0.00551	0.21988	0.98000
District 9		-0.16703	0.20476	0.41650
District 10		0.28167	0.23393	0.23120
District 11		-0.06135	0.19009	0.74750

Table 12

**percent change was calculated for parameters that are statistically significant at 10 percent significance level.*

AABP DISTRICTS IN THE UNITED STATES

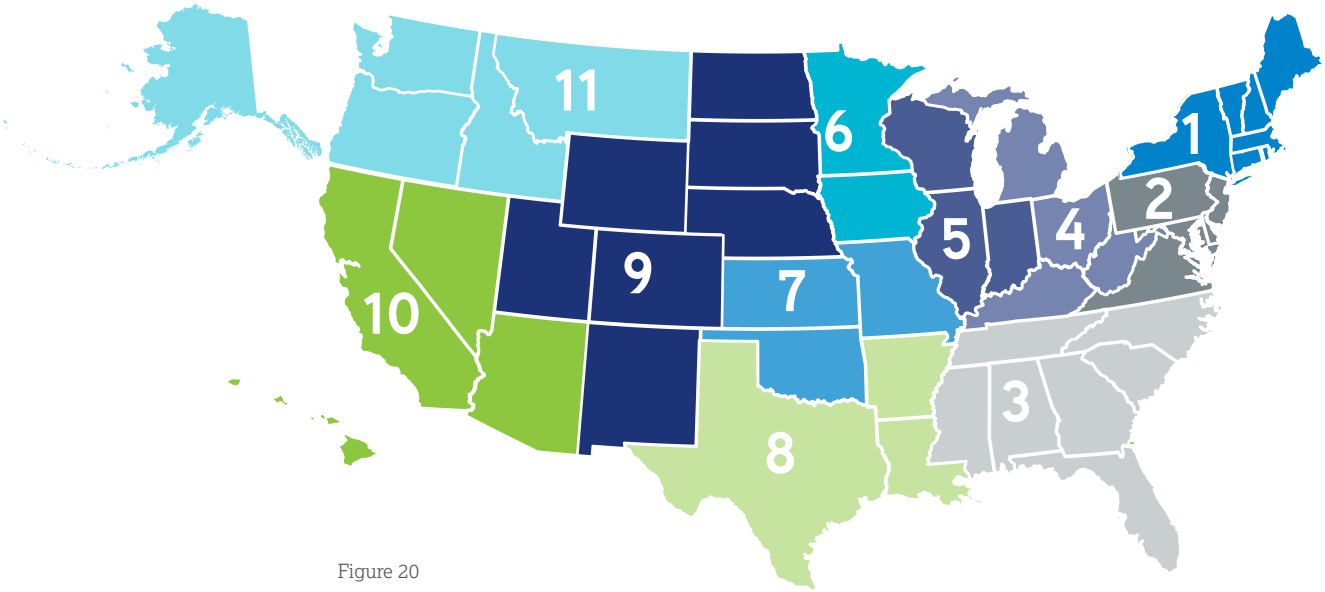


Figure 20

EQUINE VETERINARY SERVICES

The market for equine veterinary services is highly specialized, with veterinarians typically undergoing years of post-graduate training. In 2016 the AVMA VED collaborated with the American Association of Equine Practitioners (AAEP) to conduct a focused survey of U.S. equine veterinarians. The purpose of this survey was many-fold, but was partially to understand the unique problems facing equine veterinary practices.

Equine veterinary practice accounts for less than 5 percent of all veterinary practice types in the veterinary medical field. Veterinarians identifying as working with equids, whether in an exclusively or predominantly equine practice, or in a mixed animal practice, are a minority in the profession. Trends in the equine industry, and thus in the equine veterinary industry, were mostly negative in the years following the recession of 2008. Based upon AVMA data, the U.S. horse pet population is estimated to have declined by 33 percent between 2006 and 2012, and the horse population on farms that reported at least $1,000 in annual sales decreased by 10 percent. Additionally, equine veterinarians saw a 6.7 percent reduction in annual income during that same period. In contrast, companion animal exclusive veterinarians, gained a 22.7 percent increase in annual income during the same period. Gathering data about the current state of the equine veterinary industry through the AVMA-AAEP 2016 Survey of Equine Practitioners will allow stakeholders to make informed and more directed efforts to strengthen the profession.

This study of the economics of equine practitioners is a joint effort of the AAEP and the AVMA to gain an understanding of common and unique attributes of equine practices and practitioners compared to the general veterinary profession and to identify challenges facing the profession so that these issues can be addressed with maximal effect.

The forthcoming *American Association of Equine Practitioners Economic Report 2017*, includes information on demographics, the market for veterinary education, the market for veterinarians, the market for veterinary services, a portrait of equine veterinary practice, and an analysis of the impact of equine practices on economic activity in the United States.

EQUINE PRACTICE CHARACTERISTICS

Among AAEP respondents, a large share of respondents (36.5 percent) provides ambulatory or mobile services only (Figure 20). Ambulatory with a haul-in facility compromise 35.4 percent of the distribution. On the opposite end of the spectrum, respondents primarily working in a haul-in facility were only 1.3 percent, and 1.7 percent were in a full-service specialty/referral hospital.

DISTRIBUTION OF AAEP RESPONDENTS' 2015 PRIMARY PRACTICE BUSINESS MODELS

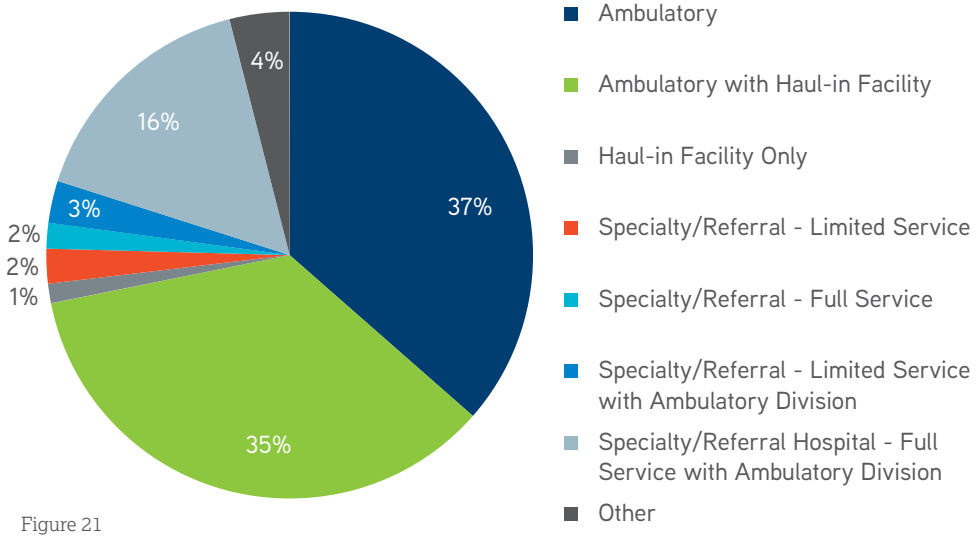


Figure 21

As with the bovine practitioners, the equine practitioners have various methods of billing with the preponderance of AAEP respondents (91.9 percent) charging a farm call or trip fee and 89.4 percent of respondents charging an emergency fee.

The method of billing for ambulatory calls varies across equine sector. Charging ambulatory visits by zones is the most common form for ambulatory billing among AAEP respondents in the hunter/jumper (76.5 percent), companion (62.5 percent), and general equine practice (68.3 percent). According to the AAEP group, only a small percentage charge one-way or round-trip for ambulatory calls. Just more than 31 percent of western performance respondents and 44.4 percent of ranch/working sector respondents charge based on mileage.

DISTRIBUTION OF AAEP RESPONDENTS' BILLING OF AMBULATORY FARM CALLS BY EQUINE SECTOR

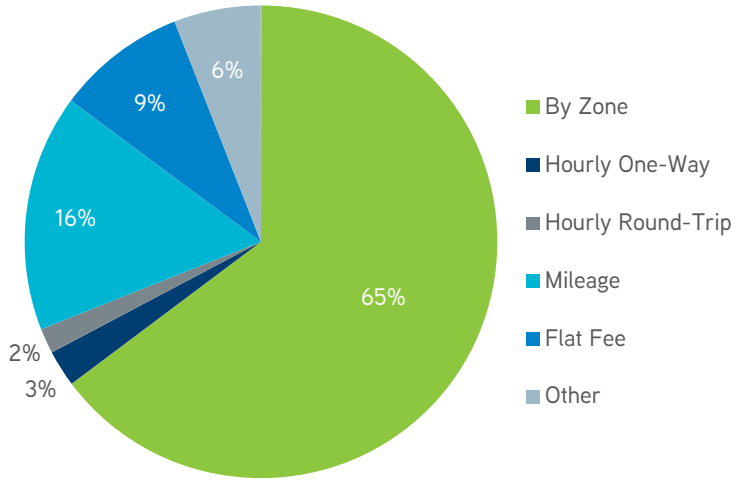


Figure 22

AAEP respondents primary practice service area covered anywhere from a zero-mile radius to a 2,500-mile radius. Nearly a third of respondents' service area was between a 21- and 40-mile radius, and 38.6 percent between 41- and 60-mile radiuses (Figure 23). Overall, the majority of AAEP respondents service area was estimated at between 0 and 60 miles, with the remainder, 22.6 percent, with a service area covering over 61 miles. Respondents in the Thoroughbred sector on average serve the largest area, 179 miles, followed directly by respondents in the ranch and working horse industry, with a 137-miles radius (Table 5.13). Respondents in the companion sector have an average service area of 45 miles. Respondents in a full-service specialty/referral hospital on average have the smallest radius among the AAEP group of 52 miles (Table 13). Respondents in some other type of business model have a service area on average of 177 miles. The majority of the respondents in this other category identified themselves as racetrack veterinarians or working in integrative therapy.

DISTRIBUTION OF AAEP RESPONDENTS' PRIMARY PRACTICE SERVICE AREA RADIUS

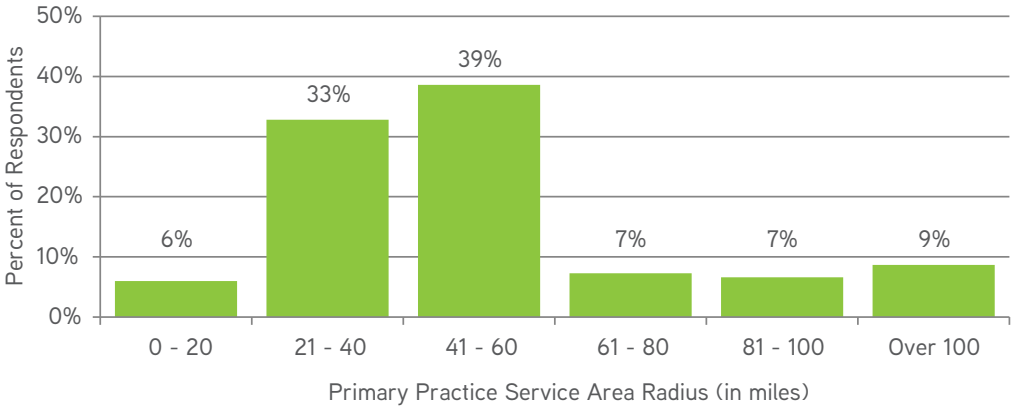


Figure 23

The ambulatory equine practitioner spends considerable time on the road, with 47 percent of AAEP respondents indicating mileage of 25,001-50,000 miles a year, followed by 29 percent travelling between 12,501 and 25,000 miles a year. Of AAEP respondents in the Standardbred industry, 71.4 percent travel between 25,001 to 50,000 miles a year, and the majority (more than 75 percent) of respondents in any equine sector travel fewer than 50,000 miles a year. Respondents' miles travelled per year by business model show that 63.6 percent of respondents in a limited-service specialty/referral hospital and 71.4 percent in a haul-in facility travel up to 12,500 miles a year. More than 30 percent of AAEP respondents in another type of business model travel more than 50,000 miles per year. These respondents reported being a racetrack veterinarian or in integrative therapies.

MEAN OF AAEP RESPONDENTS PRIMARY PRACTICE SERVICE AREA RADIUS (IN MILES) BY BUSINESS MODEL					
	Obs.	Mean	Std. Dev.	Min	Max
Ambulatory	193	76	188	1	2,500
Ambulatory with haul-in facility	184	58	45	10	400
Haul-in facility only	7	66	65	0	180
Specialty/referral hospital - Limited service	10	87	101	5	300
Specialty/referral hospital - Full service	9	52	25	15	100
Specialty/referral hospital - Limited service with ambulatory division	15	99	109	30	400
Specialty/referral hospital - Full service with ambulatory division	82	56	45	20	300
Other	19	177	306	1	1,000

Table 13

PARALLEL SERVICE PROVIDERS

Just like the bovine practitioners, equine veterinarians face competition from parallel service providers who focus on the more routine tasks of animal care. There are many types of non-veterinarian provided services such as dentistry, podiatry, sports medicine, integrative therapies, reproduction, and pharmaceutical services that were once deemed the sole market of veterinarians. These non-veterinarian providers of veterinary services are referred to as "parallel providers." The AVMA investigated the potential effect of parallel veterinary service providers on both practice revenue and the income of veterinarians for equine practices.

Equine veterinarians were asked to identify the potential competitors who have adversely affected their practices. More than 84.7 percent of the AAEP respondents have lost business to parallel service providers. Nearly a quarter (23.1 percent) of equine practices provide seasonal services in other locations or other states, and 86.4 percent of this group have had parallel providers move in on their business, whereas 13.6 percent of seasonal service providers have not seen decreased revenue from parallel providers.

The primary type of parallel services that AAEP respondents think reduces their practice revenue stream consists of dentistry at 62.5 percent, with internet pharmacies coming in at 55 percent; 11.1 percent indicated that services were impacted by university staff at university hospitals or at satellite locations.

IMPACT OF PARALLEL VETERINARY SERVICE PROVIDERS ON EQUINE PRACTICES

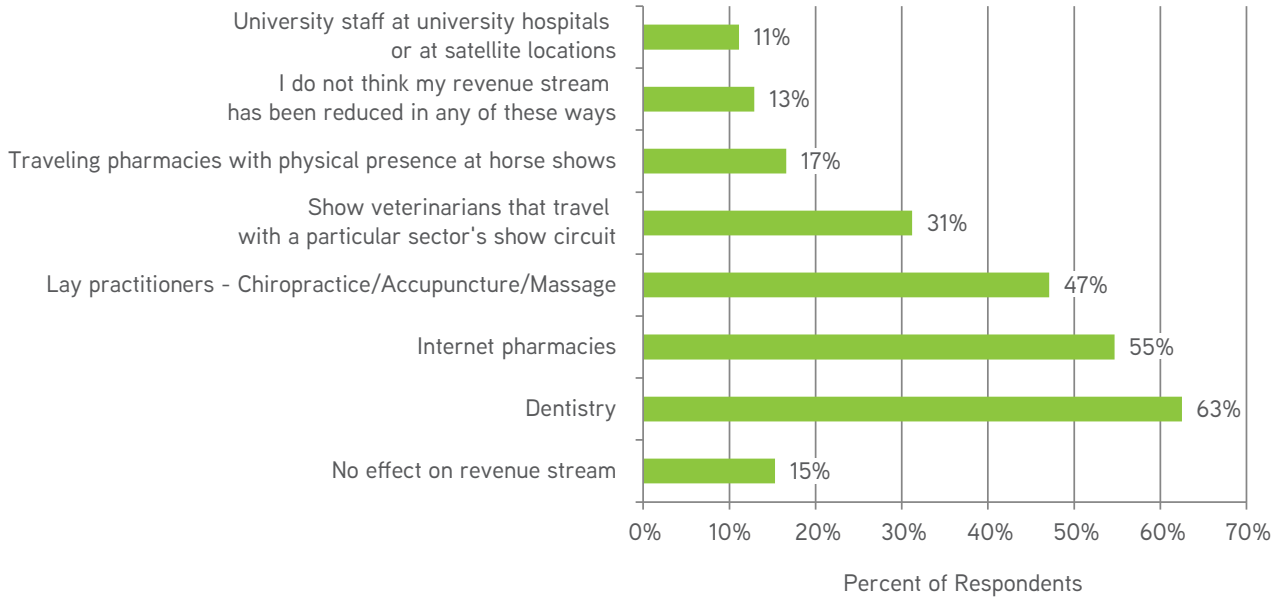


Figure 24

AAEP respondents face competition not only from parallel service providers, but also from other veterinarians within their service area. AAEP respondents reporting one to 10 other equine veterinarians in their service area comprised 26.5 percent, followed by 23.6 percent for both 11 to 20 veterinarians and 21 to 30 veterinarians. Only 1 percent of respondents did not perceive any competing veterinarians.

DISTRIBUTION OF THE NUMBER OF COMPETING EQUINE VETERINARIANS IN RESPONDENT'S SERVICE AREA

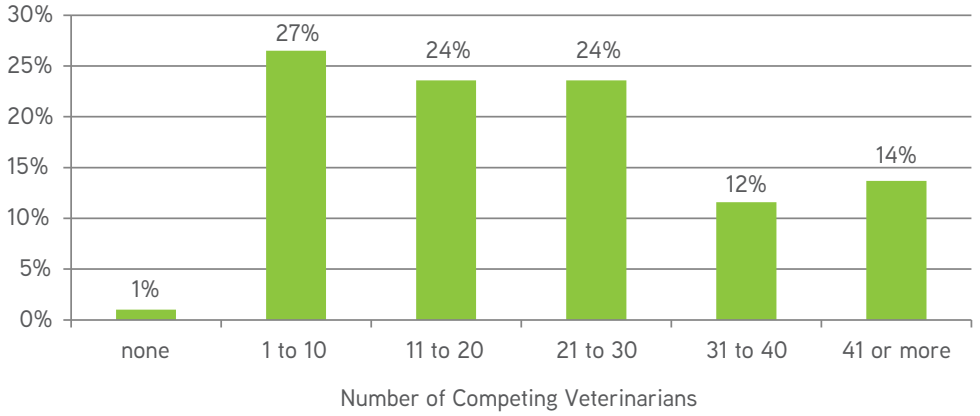


Figure 25

LABORATORY ANIMAL VETERINARY SERVICES

In the past 100 years, the laboratory animal veterinary (LAV) specialty has grown considerably. Today more than 2,000 laboratory animal veterinarians are practicing nationwide. Their ultimate goal is to ensure that animal health and welfare are maintained in scientific environments. The demand for laboratory animal veterinarians depends on the number of veterinary schools producing candidates for the specialty certification and on the number of biomedical research institutions, the largest consumer of laboratory animal veterinary services, needing these professionals.

In the market for veterinary services, demand for veterinary services comes from both private and public sources. A recent in-depth study was recently conducted between the AVMA, the American College of Laboratory Animal Medicine (ACLAM) and the American Society of Laboratory Animal Practitioners (ASLAP). Laboratory animal veterinarians are a highly specialized group. The lab animal practitioner and other public practice veterinarians are a difficult practice type to analyze in the market for veterinary services because they do not conduct financial transactions. Whereas a common approach among private practice veterinarians is to compensate based on production, or a combination of a base salary with a production component, public practice veterinarians do not have production metrics as readily and frequently available to gauge the demand for their services. Rather, the demand for public practice veterinary services can more easily be measured with other metrics. In this case, the balance between supply and demand in the upstream market for veterinary services will determine the quantity and income of veterinarians. As such, one way to measure the demand for their services is through income. To this end, the salaries of laboratory animal veterinarians are examined as an indicator of the health of their specialized market for veterinary services.

LABORATORY ANIMAL VETERINARIAN MEAN SALARY TREND

Figure 26

Laboratory animal veterinarians are among the best paid veterinarians in the United States due to the high demand for their services. The average annual professional income of laboratory animal veterinarians is well above the average income of most veterinary practitioners. This high income relative to other practice types provides a continued economic incentive to pull students and practitioners toward the LAV specialty until the demand and supply of laboratory animal veterinary services reaches equilibrium and the income of lab animal practitioners returns to a level in line with other practice types. With the continuous entry of new consumers into the market for LAV services, demand will shift up along the supply curve creating an upward trend for price. Each new business that requires research animals generates additional demand for LAVs that must be filled. The income for laboratory animal veterinarians has been consistently higher than all other veterinary professionals, indicating that the growth in the demand for LAV services has exceeded the growth in supply of LAVs, especially compared to all other segments of the veterinary profession.

The trend in professional income was determined based on the information collected from the historical salary surveys of laboratory animal veterinarians (2014 Report) and the 2015

ACLAM/ASLAP Compensation Survey. The salary survey of laboratory animal veterinarians is conducted every three years by a subcommittee representing both ACLAM and ASLAP and aims to assess the annual professional income of laboratory animal veterinarians working in the United States. For the purpose of comparison, for the *ACLAM/ASLAP Economic Report 2017* (available through the AVMA) the nominal incomes were converted into real dollar incomes, with 2010 used as the base year.

Lab animal veterinarians are employed in many areas of the public sector (including industry/corporations), and the difference in salary is displayed in Table 14. Those in industry have the highest mean salary, followed by self-employed consultants.

LABORATORY ANIMAL VETERINARIAN SALARY BY TYPE OF EMPLOYER, 2015

	Mean	Std. Dev.	1st Quartile	Median	3rd Quartile
Academia	$158,179	$60,815	$110,000	$150,000	$195,000
Industry	$203,884	$85,323	$141,500	$180,000	$260,000
Government - Civil Service	$151,525	$34,435	$122,000	$158,000	$176,000
Government - Uniformed Service	$140,460	$25,034	$120,000	$144,650	$165,000
Not-For-Profit Organization	$165,312	$68,390	$120,500	$146,000	$203,500
Self-Employed Consultant	$189,871	$81,217	$114,487	$215,000	$260,000
Other Employment	$150,092	$44,590	$117,000	$152,000	$170,000

Table 14

Experience plays a major role in salaries, with those who have practiced as LAVs for 30 or more years attaining an income of nearly $200,000, on average, per annum.

LABORATORY ANIMAL VETERINARIAN SALARY BY YEARS OF EXPERIENCE, 2015

	Mean	Std. Dev.	1st Quartile	Median	3rd Quartile
1 - 9 years	$113,297	$30,578	$98,000	$112,000	$126,000
10 - 19 years	$135,957	$38,071	$107,000	$130,000	$160,000
20 - 29 years	$181,786	$73,428	$128,000	$170,096	$210,000
30 - 39 years	$198,121	$60,009	$163,000	$190,000	$228,638
40 - 49 years	$209,175	$51,658	$171,000	$210,000	$227,000
50 years and over	$216,800	$94,906	$188,000	$230,000	$230,000

Table 15

Lab animal veterinarians have consistently enjoyed the highest level of salaries of any of the practice types studied. This high salary is indicative not only of their relatively high level of training, but also of their relative scarcity compared to veterinarians of other practice types.

LABORATORY ANIMAL VETERINARIANS ARE AMONG THE BEST PAID VETERINARIANS IN THE UNITED STATES DUE TO THE HIGH DEMAND FOR THEIR SERVICES.

VETERINARY PRODUCTS DEMAND AS A LEADING ECONOMIC FACTOR

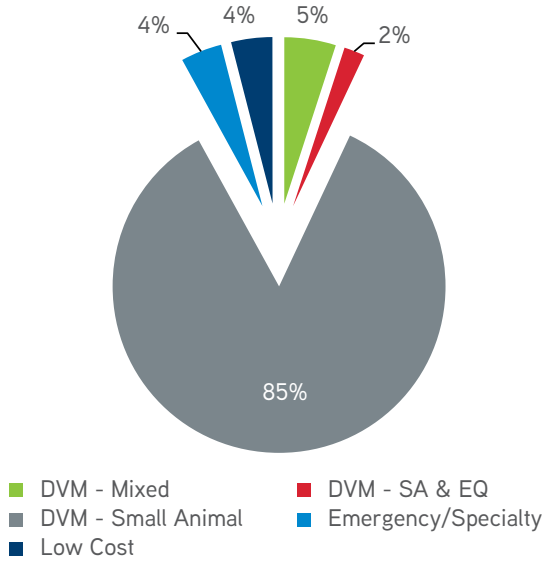
Approximately 30 percent of the revenue in veterinary practices is from the sales of pharmaceutical products.

Approximately 30 percent of the revenue in veterinary practices is from the sales of pharmaceutical products. At the 2016 AVMA Economic Summit an overview of the veterinary product markets was presented by Dr. Travis Meredith of Animalytix, a public clearinghouse for sales-aggregated industry market share information. Animalytix has a comprehensive database of nearly $60 billion in animal health product sales of vaccines, pharmaceuticals, nutraceuticals and veterinary supplies from more than 500 manufacturers. The database of animal health products has been developed through a partnership between Animalytix and leading animal health distribution companies and selected manufacturers. The animal health product market can be analyzed geographically for more than 8,500 brands on a weekly or monthly basis.

The animal health product supply data may be used to provide a profile of the current market, insight into macro trends within the companion animal market, and as a leading Indicator of industry changes, representing both opportunities and challenges.

The concentration in the market for veterinary services can be measured with the product supply data. A veterinary consumption index (VCI) is developed using a constant "market basket" of items to measure the market share of various types of veterinary practices, such as small animal, mixed animal, emergency/specialty and low-cost. Based on the VCI, 85 percent of the market for veterinary services is estimated to be associated with companion animal medicine.

ANIMALYTIX VETERINARY CONSUMPTION INDEX



What's In The Basket
Needles
Sutures
Syringes
White Goods
Fluids
Human Labeled Pharmaceuticals (Generics)
Euthanasia Products
Others

What's Not in the Basket
Canine Vaccines
Feline Vaccines
Flea & Tick Products
Heartworm Preventative Products
Other pharmaceuticals influenced by regional or seasonal epidemiology.

Figure 27

The VCI can also be used to evaluate the concentration (size and quantity) of veterinary practices in the market. Animalytix has identified 28,641 unique locations for delivery of animal health products. The largest practices (largest purchases of products) represent 5.9 percent of the total but 25 percent (Tier 1 or first quartile) of all product purchases. The second quartile contains 13.2 percent of all practices and thus, less than 20 percent of the practices account for 50 percent of the product market. The smallest group, Tier 4, comprises nearly 60 percent of practices and only 25 percent of the product market.

THE ROLE OF ENTITY SIZE AND THE IMPACT ON MARKET DISPARITY

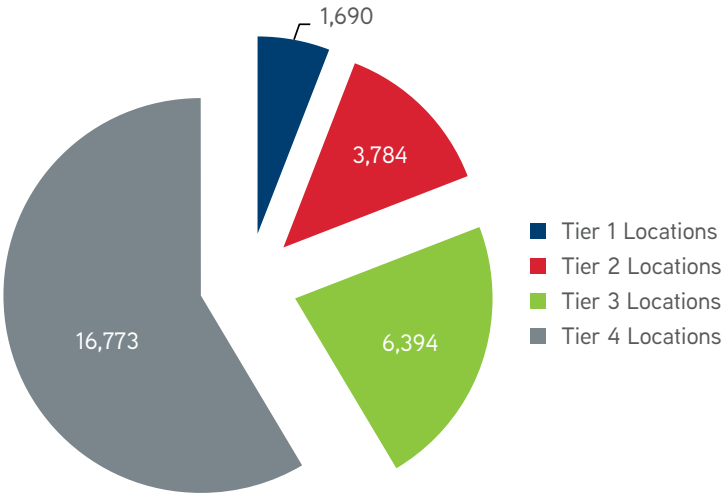


Figure 28

The VCI can also be used to identify variations in performance between markets. Measuring the percent change in the volume of sales for specific metropolitan markets provides an indication of the change in demand for veterinary services. This is an important measure and can help guide the Metro Market Demand surveys to determine what metro market to examine to understand how the national market is affected, and the factors that affect it, by the difference in demographics between geographic areas.

VCI DYNAMICS BETWEEN MAJOR MARKETS

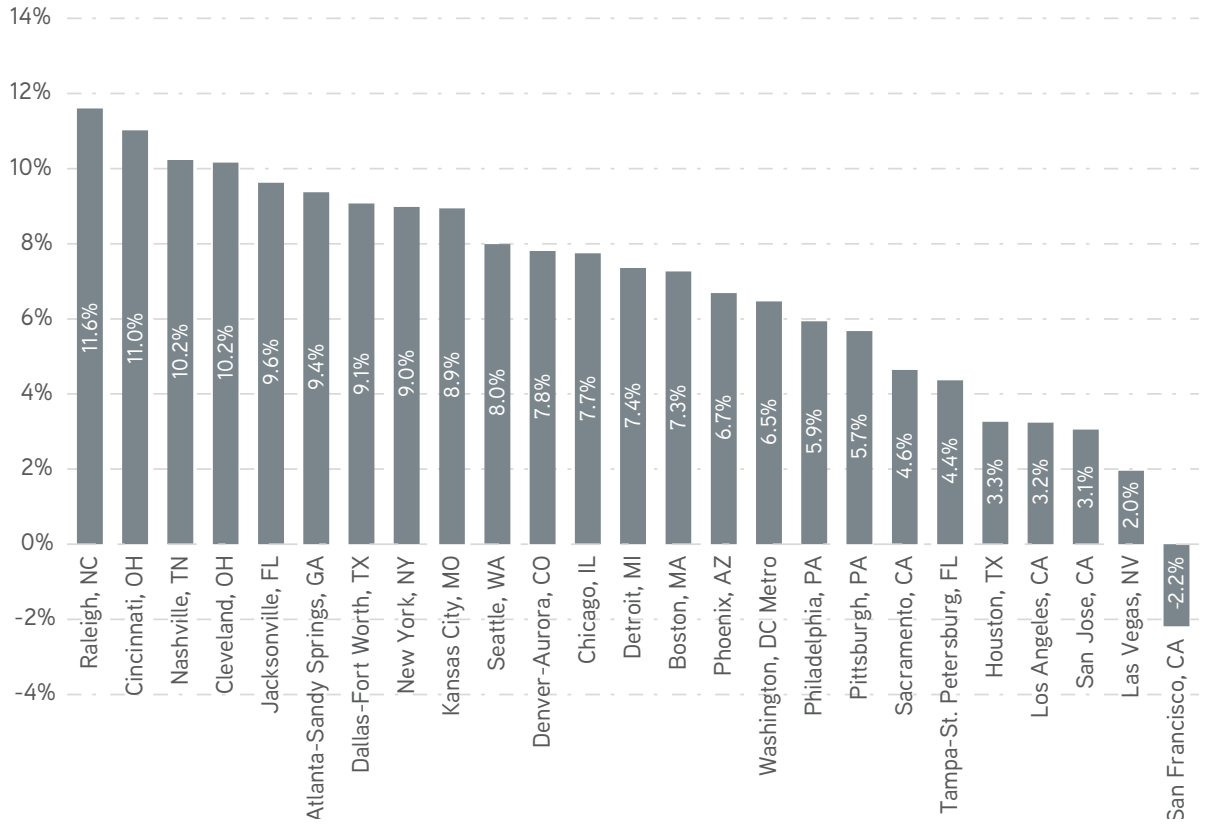
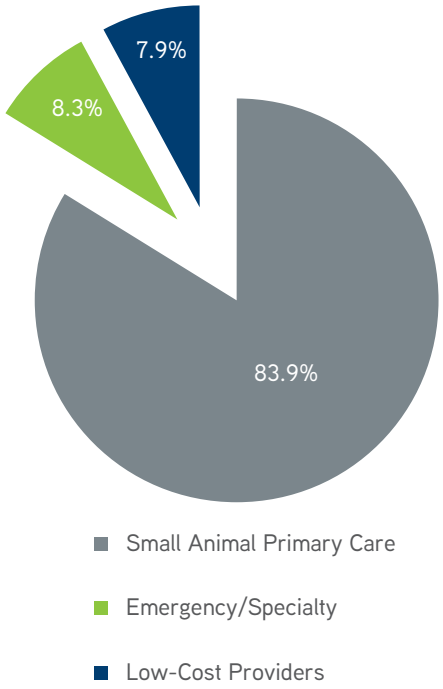


Figure 29

The analysis of the product market can also be used to evaluate changes in specific practice profit centers. For instance, inhalant anesthetics can provide a useful indicator for surgical and dental activity. Inhalants are used specifically for advanced procedures requiring patient anesthesia, are consumed in unit increments and are utilized on an as-needed basis across the operational year. Use by practice type provides an indication of where surgeries and dentals are being most performed and how that market share is changing over time. By examining the share of inhalants as an average of the number of practices in each practice type, low-cost providers can be seen to be using twice as much inhalant, and emergency/specialty practices 2.5 times as much inhalant as small animal primary care practices.

INHALANT ANESTHETIC CONSUMPTION AS A LEADING INDICATOR FOR SURGERY SUITE ACTIVITY & PER-LOCATION INHALANT CONSUMPTION DYNAMICS, 2013-2016

INHALANT ANESTHETIC CONSUMPTION AS A LEADING INDICATOR FOR SURGERY SUITE ACTIVITY



PER-LOCATION INHALANT CONSUMPTION DYNAMICS, 2013-2016

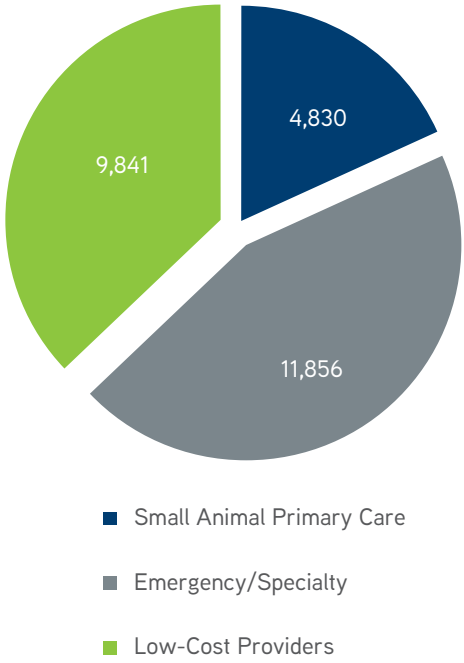


Figure 30

The product information is extremely valuable and will provide an insight into the veterinary services market, geographically, by profit center and for various animal health challenges. Coupled with the MMDs and the PDS, the profession can begin to build a more comprehensive picture of the market for veterinary services and better evaluate the factors that are the most important drivers of change.

MEASURING THE PERCENT CHANGE IN THE VOLUME OF SALES FOR SPECIFIC METROPOLITAN MARKETS PROVIDES AN INDICATION OF THE CHANGE IN DEMAND FOR VETERINARY SERVICES.

PET HEALTH INSURANCE AND VETERINARY EXPENDITURES

Higher income for a household is strongly correlated with an increased probability of visiting a veterinary clinic.

A persistent question in the veterinary profession is whether pet health insurance (PHI) increases the demand for veterinary services from individual pet owners. Unfortunately, there is no published statistically valid literature that addresses this question. There have been studies that have noted an association between higher levels of pet owner expenditures and pet health insurance, but these analyses fail to control for confounding factors. A higher income individual is probably more likely to have pet health insurance compared to a lower income individual, for example, and those higher income individuals are likely to spend more on veterinary care than are low-income individuals. And, pet owners with greater human-animal bond will spend more on animal health care. Thus, the cohort of pet owners who have pet health insurance may be those with a higher propensity to purchase pet health care services.

If the social sciences were conducted exclusively in laboratories in conditions under which human behavior could be perfectly controlled, then economists wouldn't need statistical methods beyond calculating means to measure human behavior. Think about the perfect experiment to determine the effect that pet health insurance has on consumer behavior. In that experiment economists would randomly find an individual pet owner without pet health insurance, and carefully observe her purchases of veterinary services over the course of a year. At the end of the year the analysts would go back to the beginning of the year and instead provide this person with pet health insurance, observing and noting any differences in her behavior regarding the purchase of veterinary services.

Unfortunately social scientists cannot control for all possible factors in a laboratory, so they use statistical techniques as the next best method. These statistical techniques, typically some version of ordinary least squares multiple regression analysis, associate and quantify characteristics of individuals. For example, previous research has shown that pet owners who consider their pets to be members of the family are less price sensitive than those who consider their pet to be property. Similarly, higher income for a household is strongly correlated with an increased probability of visiting a veterinary clinic.

A statistic that has been repeated many times, and is easy to demonstrate, is that pet owners with pet health insurance visit veterinary clinics more often and spend more money and visit veterinary practices more times in a year than do pet owners who do not have pet health insurance. But many factors specific to the animal, consumer and veterinarian affect the services purchased by an individual. The only way to determine the independent effect of insurance on consumer behavior is to control for the individual characteristics that could affect purchases of both veterinary care and pet health insurance. Some notable examples of these factors are household income and measurements of attitude, such as how the survey respondent values preventative care. Two alternatives exist, the first of which is to collect a large enough set of observations of pet health care decisions by owners with and without pet health insurance. To get close to comparing the same pet owner's decisions with and without pet insurance the data would compare similar pet types, ages and health as well as pet owners' socio-economic characteristics.

AVMA partnered with Mississippi State University (AVMA-MSU study) in 2014 to begin the process of evaluating the effect of pet health insurance on the demand for veterinary services. The AVMA-MSU study did indeed find that pet owners with insurance spend more on the pet, not only on veterinary care, but also on other expenses such as entertainment, food and boarding. This comparison of means is displayed in the following chart.

AVERAGE EXPENDITURES WITH AND WITHOUT PET HEALTH INSURANCE

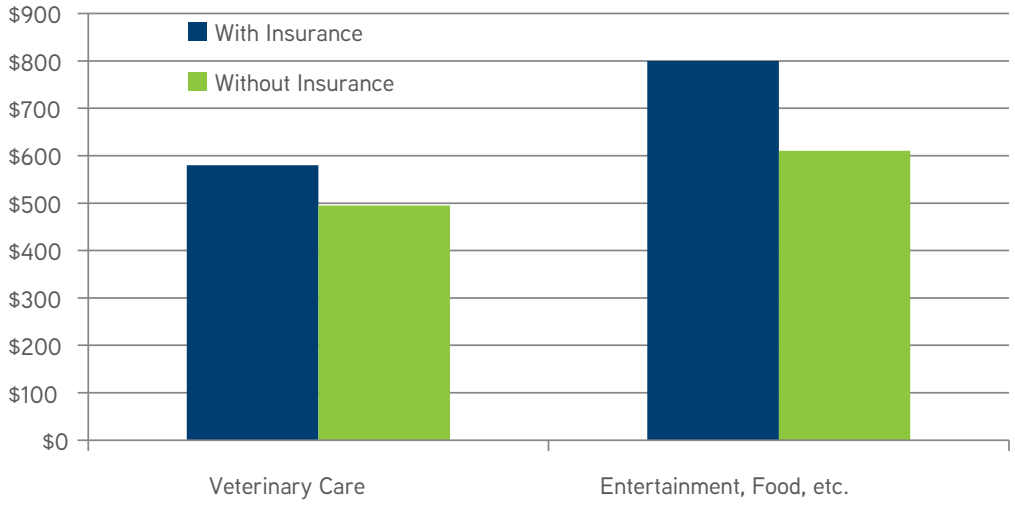


Figure 31

Pet health insurance protects owners against rare, potentially catastrophic events where the life of the pet may be in jeopardy. For a specific person over a specific time period, these events are relatively rare. Furthermore, pet health insurance is not widespread in the United States, with a market penetration of only about 3 percent of pet owners. Because of these two facts, even a large survey of random pet owners would only pick up a few responses from individuals who recently made use of their pet health insurance policy.

One interesting aspect of pet health insurance is that veterinarians have reported that, given a possible set of choices, pet owners with PHI tend to choose the more expensive options.

In order to mimic this set of choices, the AVMA-MSU survey asked respondents to choose between a hypothetical set of alternatives with different costs and recovery options associated with each. From the four choices, the survey respondents with insurance were much more likely to pick more expensive treatment options than were those respondents without insurance. Furthermore, the choice of euthanasia (at a cost of $100) was reduced from 31 percent to 3 percent through the election of the emergency survey and thus not only were current expenditures increased but future expenditures would also increase through the increase in the lifespan of the pet.

CLIENT WILLINGNESS TO SPEND WITH AND WITHOUT PET HEALTH INSURANCE

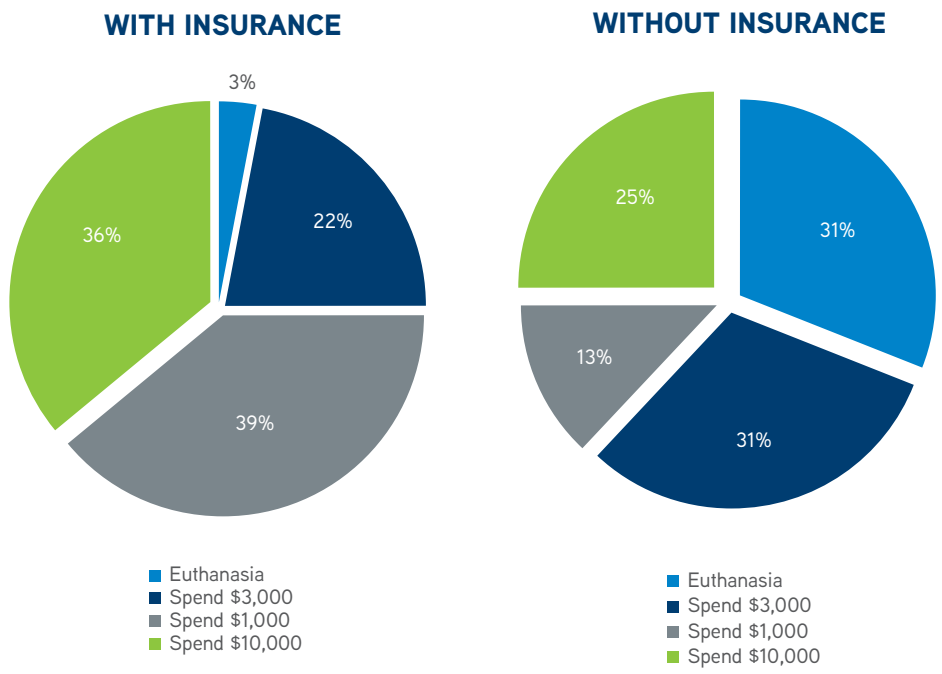


Figure 32

These results were based on a preliminary set of data, not the full set of survey respondents. Additional information will be released as the study develops, and the full set of control variables is determined.

PUBLIC HEALTH VETERINARY EXPENDITURES

A growing body of literature suggests that animal diseases are burdens to households, regions, countries, and society in general.

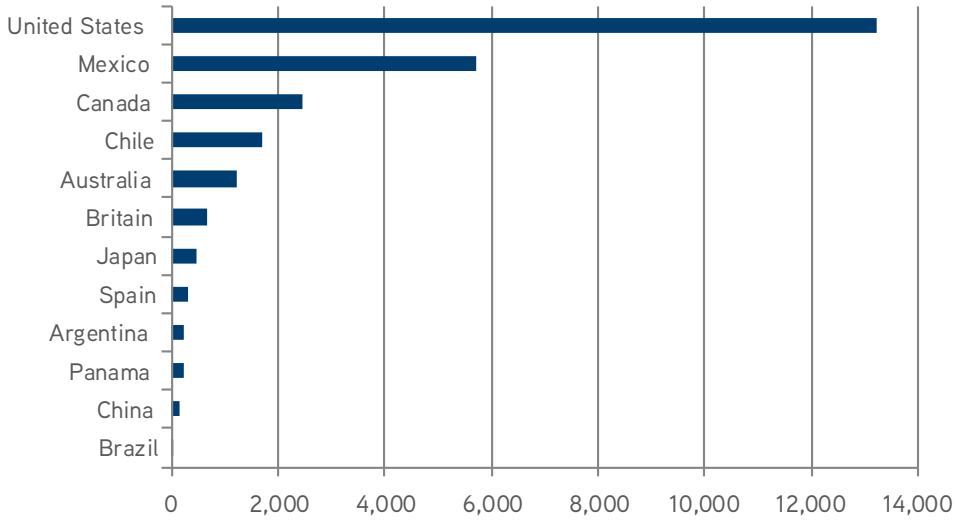
The public practice of veterinary medicine includes public health services such as monitoring and managing food safety and zoonotic diseases. A growing body of literature suggests that animal diseases are burdens to households, regions, countries, and society in general. The world population has doubled since 1960 and continues to grow, with nearly 1 billion people added every 13 years. Food insecurity and malnutrition remain persistent world problems.

ZOONOTIC DISEASES

The potential havoc wreaked by zoonotic diseases is an ever-present problem facing public health in the United States and the world at large. Consider that 60 percent of all infectious diseases are zoonotic (Taylor et al. 2001) and 15 of the 35 leading communicable causes of death are zoonotic in nature. Zoonotic diseases adversely affect human health both through negative consequences to livestock and direct effects on human health.

The primary commodities feeding into the global production of food are crops and livestock. Four livestock and livestock products are ranked by value among the top 10 commodities produced in the world. Animal diseases reduce both the quality and quantity of these four livestock products, reducing the availability of protein for the human diet.

SWINE FLU CASES BY COUNTRY



Source: World Health Organization

Figure 33

Because the monitoring and managing of zoonotic diseases is a public veterinary service, the determination as to the number of veterinarians required is a decision for state and federal governments. To ensure that there is an adequate quantity of these public veterinary services provided, governments need the best information on the trade-offs between the costs of prevention and the costs of treatment. More specifically, what are the avoided costs of zoonotic disease outbreaks versus the expenditures required to ensure that avoidance? And, this estimate of benefits (cost avoidance) to costs of adequate monitoring and management should be made for all potential zoonotic disease outbreaks rather than for each individual potential outbreak as many of the potential zoonotic diseases have similar geographical origins.

AVMA VED is cooperating with the Paul G. Allen School for Global Animal Health and the School of Economic Sciences at Washington State University on research intended to develop a process for measuring the costs of zoonotic diseases and determining a level of monitoring and management that would maximize the benefit/cost ratio, and in so doing, calculate the optimum quantity of veterinary services (number of veterinarians) that should be purchased by state and federal governments.

To make this estimate of the expected costs of a zoonotic disease outbreak, two primary classes of components are needed: the probability of an outbreak and a projection of its extent, as well as a calculation of the associated costs and benefits of such an outbreak. For the first component, the epidemiology literature abounds with estimated models of disease outbreak, which include both the probabilities of such events occurring, and the extent of harm to humans and animals expected.

For the second component, a growing field of literature looks at estimating the economic effects of zoonotic disease events. Important in these estimations are the separation between direct costs and indirect costs and benefits. The direct costs arise from the tangible activities related to animal quarantine, surveillance, vaccination, indemnification, euthanasia, and cleaning and disposal, as well as the costs associated with human health. The indirect costs and benefits arise from the effects of price shocks on consumers and producers.

TOP MARKETS FOR U.S. BEEF ($ MILLIONS)				
	Japan	Mexico	South Korea	Canada
2003	$1,182	$623	$754	$309
2004	$31	$393	$2	$105
2005	$50	$584	$3	$194
2006	$105	$786	$4	$415
2007	$294	$737	$124	$576
2008	$439	$895	$291	$683
2009	$495	$770	$215	$622
2010	$662	$669	$504	$731
2011	$873	$791	$661	$1,039
2012	$1,000	$647	$548	$1,189
2013	$1,283	$739	$567	$1,197
2014	$1,419	$943	$824	$1,052
2015	$1,080	$852	$778	$925

Table 16

**BSE was confirmed in a U.S. cattle sample in late December 2003. Before BSE, the countries in this table accounted for more than 90 percent of U.S. beef exports. Sources: World Agricultural Supply and Demand Estimates, National Agricultural Statistics Service and Economic Research Services.*

Just as there are two sides to every coin, even negative events like zoonotic disease outbreaks are associated with economic benefits for some market participants. For example, in the Avian Influenza (AI) outbreak of 2014 in the United States, the market saw the death and destruction of large numbers of animals. The destruction was so large that it affected the market price for eggs and poultry protein. Despite increased security and costs associated with AI testing, the majority of poultry producers were unaffected directly by AI, but instead indirectly benefited through the spike in prices that ensued. This price spike above the long-term market price, then, was actually a boon for the majority of poultry producers. This is not to say that AI was a positive event for all involved, but benefits were realized — they were just distributed unevenly among producers.

A second class of benefits for some producers may come in the form of international trade barriers. In the event of the erection of a trade barrier in response to a zoonotic disease event, some producers stand to gain while others stand to lose. The cases of mad cow disease and foot and mouth disease are good examples of where a handful of countries enacted trade embargoes to bar imports from countries experiencing infections. This effectively increased the domestic price of beef in the countries which enacted the trade embargoes and, in turn, benefited those countries' domestic beef producers at the expense of the rest of the world's producers.

Of course, every transaction has two sides, and if the domestic price of an animal protein is higher, the implication is that consumers must also be paying a higher price, which is counted as a cost. Contrary to expectation, the increase in consumer costs does not necessarily outweigh the increase in producer benefits. Instead, the relative distribution of benefits is determined by the relative price elasticities for consumers and producers. Whether price changes are net positive or negative additionally depends on the availability of substitutes: When consumer preferences between two animal protein sources are more equal, a price shock in one would cause substitution to the unaffected protein source.

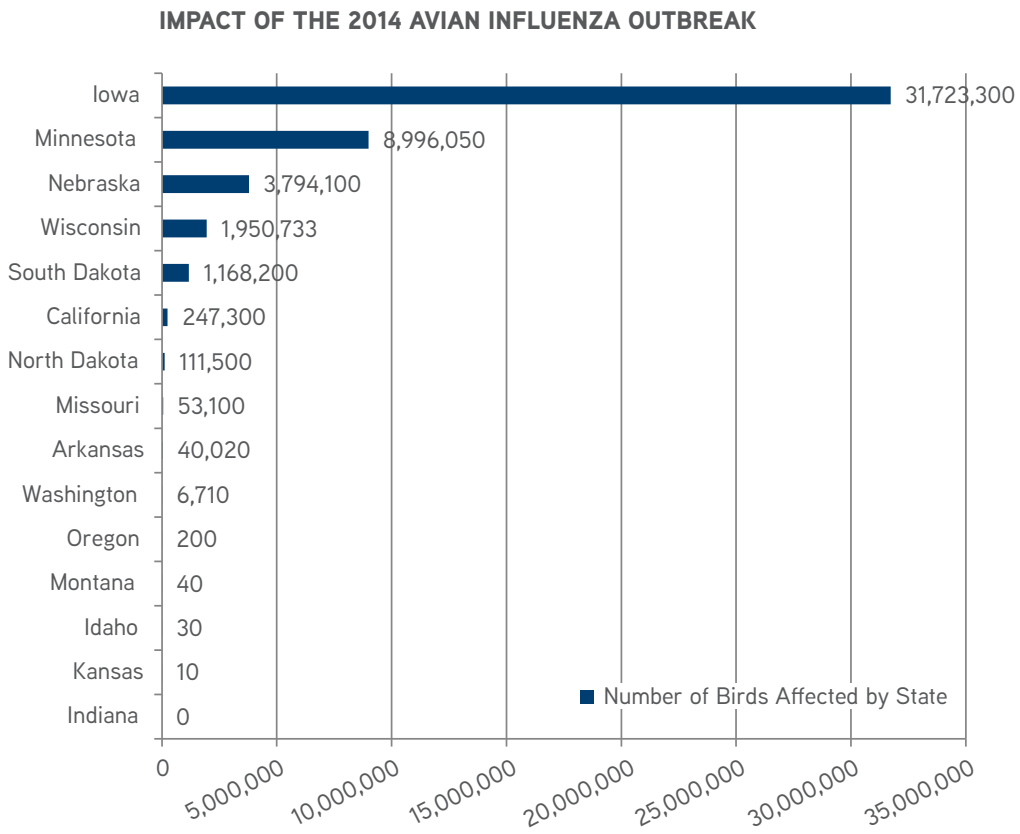
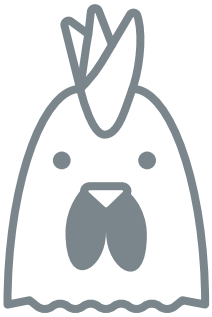


Figure 34

To begin the development of a standard process for measuring benefits and costs, the research began by analyzing the recent avian influenza outbreak. For this specific zoonotic outbreak no documented human health event or costs to individuals occurred. Approximately $879 million, however, was spent on the outbreak and subsequent planning activities (Johnson et al 2016), of which $200 million was spent on indemnity payments and $610 million on response activities on premises. In addition to these costs, poultry producers lost more than $1 billion and consumers paid higher prices for poultry products.



COST OF THE 2014 AVIAN INFLUENZA OUTBREAK	
	($Millions)
Welfare to Producers	$1,000
Indemnity Payments	$200
Response Activities	$610
Other Costs	$69

Table 17

THE HUMAN-ANIMAL BOND

The Human-Animal Bond Research Institute (HABRI) released a study in December 2015 (Clower and Neaves, 2015) detailing its researchers' first best guess at the economic value of companion animals to human health. The report focused on two aspects of human health benefits: the benefits related to reducing the number of physician office visits, and the savings related to obesity treatments. The estimated total savings in the United States for human health care from companion animals was estimated to be $11.8 billion, of which $11.4 billion was from savings related to physician office visits and $0.4 billion was from savings related to obesity treatments.

Beginning in 2016 the AVMA has, in collaboration with the University of Colorado-Boulder, began reviewing all relevant and available original studies about measuring the effect of the human-animal bond. Researchers identified 373 relevant studies using the HABRI central database, and narrowed the field to 151 actual academic studies that were original studies (not reviews, magazine articles, or news stories), written in English and accessible through library resources.

The researchers identified seven broad areas of health that have been studied in papers within the HABRI central database. These seven areas are: walking/physical activity, zoonoses, cardiovascular health, injuries among the elderly (a negative benefit of the human-animal bond), stress, depression, and general psychological wellbeing. As depicted in the Figure 35, the first two categories, walking/physical activity and zoonoses make up nearly half of the studies, with cardiovascular health trailing in third place.

HUMAN-ANIMAL BOND RESEARCH STUDY TOPICS

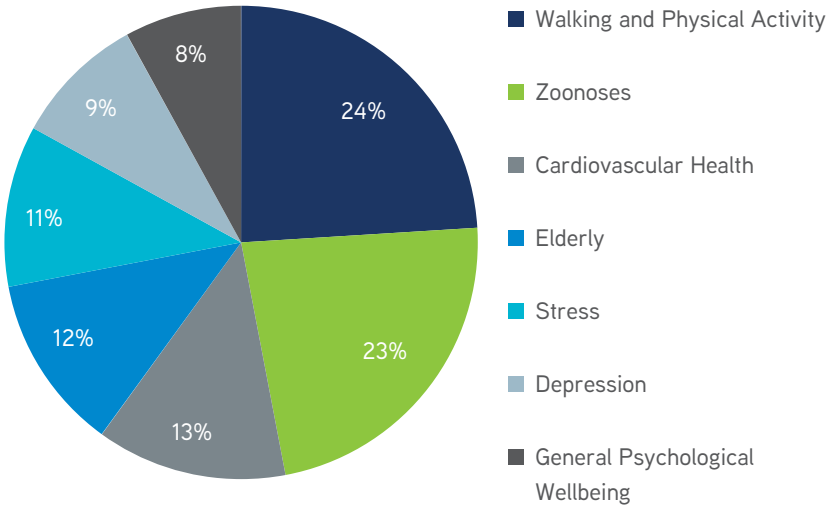


Figure 35

The results were inconsistent across studies. While 72 percent of studies reported a health benefit to the human-animal bond, the remaining 28 percent reported no measurable effect, or a negative effect. These negative effects were primarily contained in the elderly category where the negative effects of companion animals occur through the injury of elderly pet owners.

A number of sampling issues were evident across the studies, in which most samples consisted of a small, select group of individuals — for example, only cardiovascular patients already receiving treatment at a particular hospital. Furthermore, because of the experimental designs and expense involved in monitoring health outcomes, most studies involved small samples, but the studies that involved larger samples were generally less rigorous because they were cross-sectional and therefore only measured correlation, not causation.

STUDIES BY CATEGORY		
	Positive Benefits	Lack of or Negative Benefits
General Physical Health	25	21
Cardiovascular Health	28	5
Psychosocial Health	22	13
Physical Activity	33	1
Other	0	3
Total	**108**	**43**

Table 18

The next step in this research will be to estimate the benefits of animal ownership across each of the seven topic areas by using the best studies from each. Alternately, a simulation study could be performed to study the potential distribution of benefits, given that there is no way to compare or control for factors across these studies, as a simulation could give more insight than would a simpler approach.

VETERINARY PRACTICES

Close to three-quarters of the U.S. active veterinarian workforce are employed by private practices.

Estimates of veterinary practices in the United States vary between just over 28,000 and nearly 32,000 depending on the source of information. The process to determine the actual number of veterinary practices by AVMA's VED is still evolving and will consider the data from the AVMA's veterinary database, various industry estimates such as that presented above by Animalytix, the U.S. Census of Services, the American Consumer Survey, the Bureau of Labor statistics on veterinary employees, and the general accounts tabulated within the NAICS Veterinary Services segment for the national accounting of GDP (IMPLAN). This calculation process estimates that there were 31,830 businesses that provided veterinary medical services in 2016 and employed (including owner-operators) 75,754 veterinarians.

More important than the number of practices and veterinarians who work in them, is the financial performance of these practices and the factors that are important in determining how well they are performing. For this, there is no national data. One of the major challenges in obtaining national data from across veterinary practices to develop a performance KPI has been the absence of a standard chart of accounts (COA) for veterinary practices. Each practice aggregates the individual product and services into costs and revenue categories; practices, too, might manage assets as part of the practice or as a separate business. Practices also differ in whether they use book value or fair market value in inventory and asset valuation, and reflect considerable variation in the distribution of revenue across enterprises (e.g., imaging, wellness, surgery, boarding, grooming).

At the AVMA's 2016 Veterinary Economic Summit, the president of VetPartners noted the effort underway through the Economic Advisory Research Council to develop a profession-wide standard COA, and this was accomplished by the spring of 2017 with collaboration from the AVMA, the American Animal Hospital Association (AAHA), Veterinary Management Groups (VMG), VetPartners, the Veterinary Hospital Managers Association and accounting firm Katz, Sapper and Miller (KSM). The new AAHA/VMG COA can be found at https://www.aaha.org/professional/resources/chart_of_accounts.aspx

While there are groups of practices such as VMG practices, National Veterinary Associates, Banfield veterinary hospitals, and others that have collected specific performance data on veterinary practices, either the data are not publically available, not complete, or both. And, it is difficult to determine whether the data are comparable as the veterinary practices use a number of different charts of accounts to aggregate their costs and revenues.

VETERINARY PRACTICE STATISTICS AND KEY PERFORMANCE INDICATORS

Close to three-quarters of the U.S. active veterinarian workforce are employed by private practices. In private practice, as opposed to government or industry positions, a primary measure of the productivity of a veterinarian is total personal gross revenue.

GROSS REVENUE OF FULL-TIME PRIVATE PRACTICE VETERINARIANS, 2015

	Mean	Std. Dev.	1st Quartile	Median	3rd Quartile
Total Personal Gross Revenue	$453,894	$703,004	$150,000	$400,000	$573,000
Percent from Professional Services	66%	29%	60%	75%	85%
Percent from Product Sales	21%	17%	5%	20%	30%

Table 19

Employers often incentivize veterinarians to work not only for monetary compensation, but other benefits as well. These benefits are detailed in the following table and include medical benefits such as health, dental and disability insurance; leave benefits for sickness, vacation and holidays, and benefits specific to veterinarians such as discounted pet care, association dues, and professional license fees. In general, veterinarians working in the public sector are more likely to be provided benefits related to medical and sick leave, but less likely to be provided benefits unique to veterinarians. In both the public and private sectors, 8 percent of veterinarians report that they receive no employer-provided benefits.

EMPLOYER-PROVIDED BENEFITS, 2016

	Private	Public
Medical/hospitalization plan	58%	82%
Dental plan	31%	66%
Disability Insurance	30%	52%
Life insurance	27%	56%
Liability insurance	56%	35%
Paid sick leave	37%	64%
Paid vacation leave	60%	76%
Paid legal holidays	38%	66%
Continuing education leave	58%	53%
Continuing education expenses	77%	61%
Licenses	76%	51%
Association dues	71%	50%
Tax-deferred retirement plan	42%	56%
Employer contribution/match	43%	53%
Informal profit-sharing plan	3%	4%
Personal use of vehicle	14%	8%
Discounted pet care	75%	31%
Other	4%	5%
No benefits provided	8%	8%

Table 20

Veterinarians reside and practice in communities with many different designations from rural/urban to non-metro and metropolitan. By community size, the largest group of veterinarians are those who reside in communities of 2,500 to 49,999 residents (39 percent), with the next largest group residing in communities of 50,000 to 499,999 residents (36 percent).

COMMUNITY SIZE OF PRIVATE PRACTICE VETERINARIANS, 2016

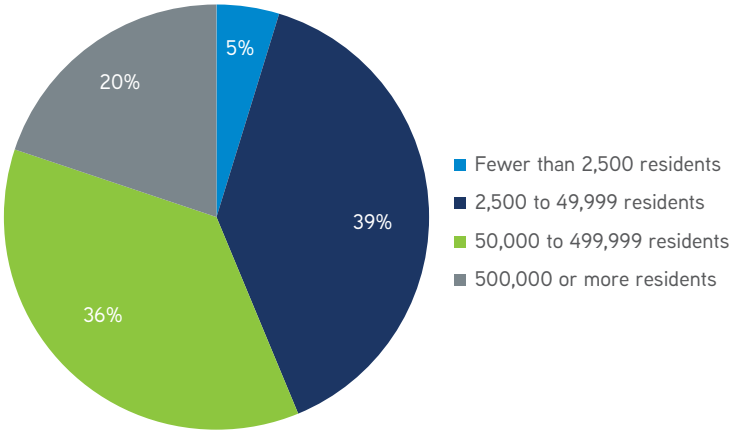


Figure 36

Among veterinary practices, the majority of associate veterinarians practice general medicine (80 percent), while 10 percent are primarily involved in providing specialty care.

ROLE OF ASSOCIATES IN PRACTICES, 2016

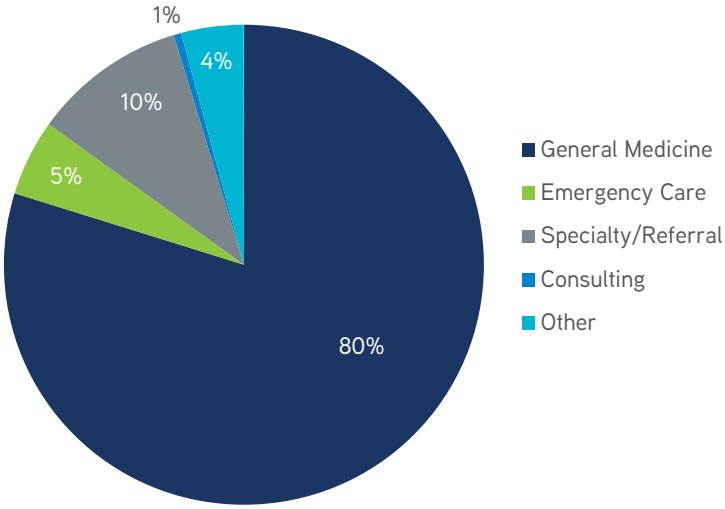


Figure 37

Roughly 25 Percent of veterinarians indicate that they are practice owners, with another 17 percent indicating that they are looking to purchase a practice.

PRACTICE OWNERSHIP STATISTICS, 2016	
Total Survey Respondents	2,541
Public Practice	33%
Private Practice	67%
Private Practice, Owner	25%
Private Practice, Looking to Purchase a Practice	17%
Private Practice, No Plans to Become an Owner	58%

Table 21

While 56 percent of veterinarians are female, only 19 percent of females want to purchase a practice while 34 percent of male veterinarians wish to purchase a practice.

ASSOCIATES WANTING TO BUY A PRACTICE, 2016		
	Male	Female
Want to Buy a Practice	34%	19%
Do Not Want to Buy a Practice	66%	81%
Region of Associates Wanting to Buy a Practice		
Region 0	1.2%	4.9%
Region 1	1.6%	6.1%
Region 2	4.5%	5.7%
Region 3	3.6%	6.9%
Region 4	2.4%	10.9%
Region 5	2.4%	5.3%
Region 6	4.9%	5.3%
Region 7	3.2%	7.7%
Region 8	3.2%	4.9%
Region 9	3.6%	11.7%

Table 22

About 22 percent of associate veterinarians in private practice are looking to purchase a veterinary practice in the future. Survey respondents were planning purchases from between 0 and 120 months in the future, with a median of 24 months and a mean of 33 months. The most frequent response was 36 months.

IN HOW MANY MONTHS (FROM JULY 2016) DO YOU PLAN TO PURCHASE A PRACTICE?

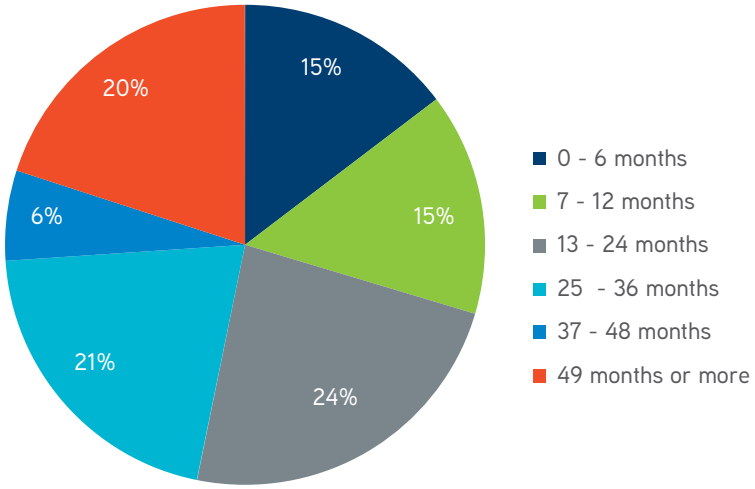


Figure 38

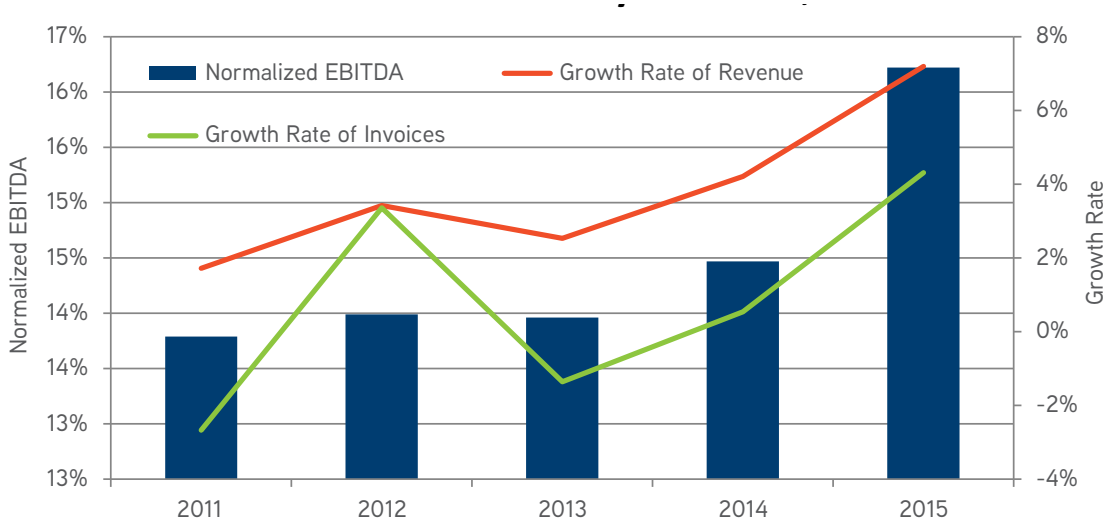
VETERINARY MANAGEMENT GROUPS

The continued recovery from the recession is being felt in veterinary practices, as seen in the mean earnings before interest, taxes, depreciation and amortization (EBITDA) of the Veterinary Management Group (VMG) practices. Terry O'Neil, of Katz, Sapper and Miller, which provides analytics for the Veterinary Management Groups, provided an overview of the financial performance of the more than 400 veterinary practices that provide practice financial data to KSM.

The KSM data are one of the few sets of practice financial data that are available to provide a picture of the changing financial health of veterinary practices from year to year. Because of the great diversity in veterinary practices both from the demographics of the communities they serve and the profit centers on which each practice focuses, however, these 411 practices are insufficient to provide national financial guidelines that may be applicable to every practice. Developing these industry standard KPIs for the various-sized markets and the product and service focus of each practice is important to help guide the practices in strategies to improve financial performance.

Nevertheless, the VMG practices indicate that revenue and EBITDA were continuing their upward trend through 2015. Average revenue growth has been increasing for the past few years and saw a large pickup in 2015 compared to 2014. This was accompanied by a large increase in the number of invoices per FTE veterinarian and EBITDA increasing to levels higher than that seen in the recent past.

REVENUE TRENDS IN VETERINARY PRACTICES, 2011-2015

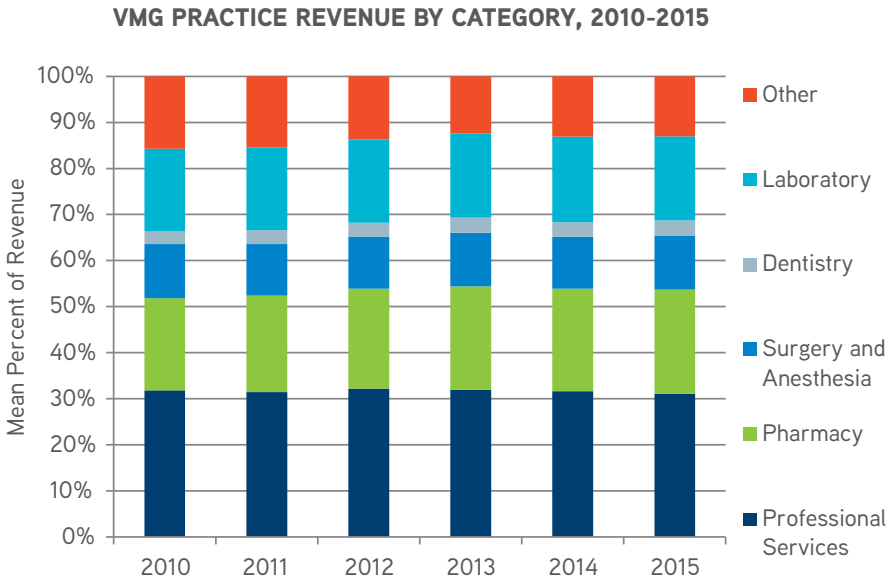


Source: Katz, Sapper and Miller and the Veterinary Management Groups

Figure 39

AVERAGE REVENUE GROWTH HAS BEEN INCREASING FOR THE PAST FEW YEARS AND SAW A LARGE PICKUP IN 2015 COMPARED TO 2014.

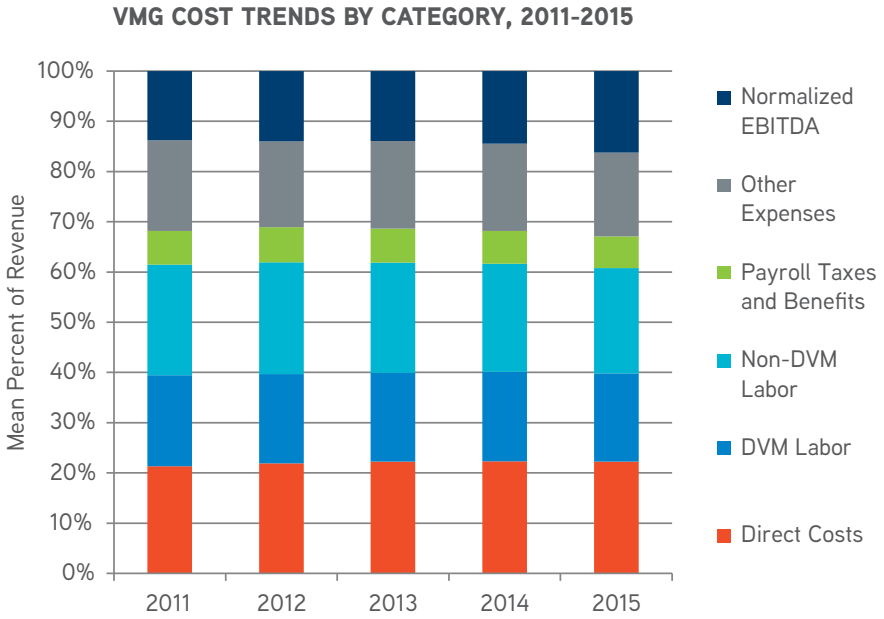
At the same time that EBITDA has been increasing, the professional services percent of total revenue has been falling, meaning that revenue from pharmacy, laboratory, product sales, and other sources have been increasing as a percent of revenue.



Source: Katz, Sapper and Miller and the Veterinary Management Groups

Figure 40

These statistics indicate that the most profitable practices tend to be those that have best controlled their costs by maintaining the lowest cost of acquiring new clients–at below $25 per new client–and keeping labor costs below 40 percent of total revenue.



Source: Katz, Sapper and Miller and the Veterinary Management Groups

Figure 41

The cost of DVM labor is lower for the most profitable practices. This may indicate that top-performing practices are better able to leverage their use of veterinary technicians. However, non-DVM labor as a percent of revenue is also lower for the highest-performing practices. And also the ratio of support staff to DVMs is almost identical in both groups. Overall, it appears that the top-performing practices save overall on labor costs.

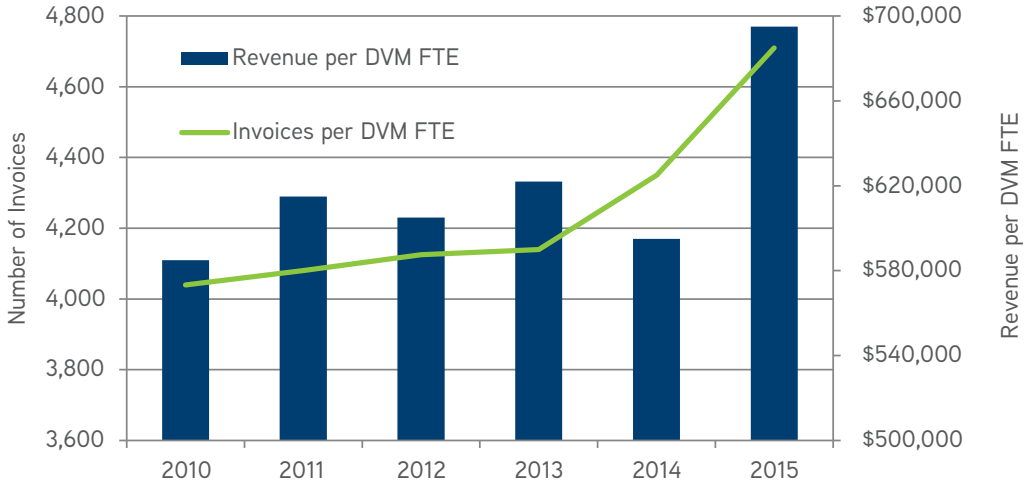
Overall cost KPIs for practices in 2015 indicated direct costs of 22 percent of revenue, while labor and benefits made up 45 percent of revenue, with an average EBITDA of 16 percent.

While the number of invoices per DVM FTE has increased, the average client transaction remained in the $150 range. Growth in revenue may have been a result of higher prices, an expanded bucket of services, or most likely both.

VMG PRACTICE EXPENSE BY KPI, 2015	
Revenue	Percent
Direct Costs 22%	
Labor and Benefits	
Owner and Non-Owner DVM	18%
Non-DVM Staff	21%
Payroll Taxes and Benefits	6%
Total Labor and Benefits	45%
Gross Profit 33%	
General and Administrative	
Advertising	1%
Administrative and Fee Collection Costs	5%
Rent	6%
Facility and Equipment Costs	4%
Other Employee Costs	1%
Total General and Administrative	77%
EBITDA 16%	

Table 23

REVENUE GROWTH PER DVM FTE, 2010-2015



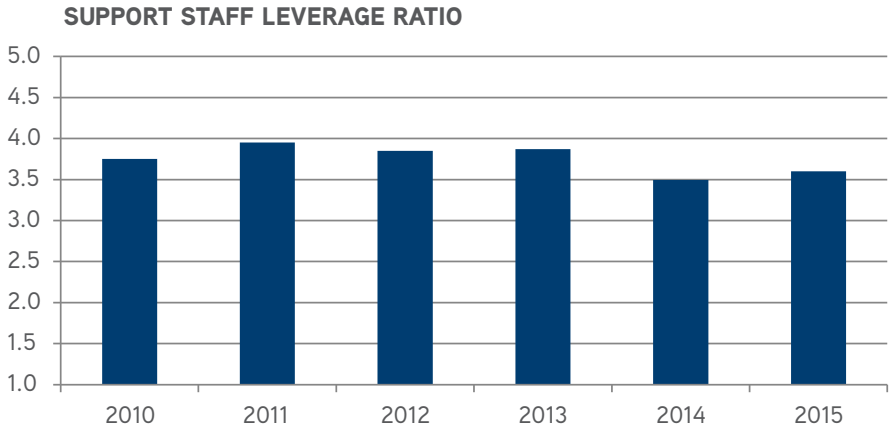
Source: Katz, Sapper and Miller and the Veterinary Management Groups

Figure 42

There is no clear trend in recent years for revenue per DVM FTE, though the level has increased to nearly $700,000 in the most recent year for which data were collected. This lack of trend may be an artifact of the way it is calculated, owing to the fact that the VMG definition of FTE is standardized for all practices and may not have exactly the same definition as it does when used colloquially. One thing that stands out is that the number of invoices per DVM FTE has been much higher for the highest performing practices, that is, until the last year of available data, when the average from the dataset caught up to those in the highest quintile.

One way to increase profitability may be to look at non-medical services as profit centers. Statistics show a strong positive relationship between EBITDA and the percent of sales due to boarding and grooming. Indeed, while this may mean that designating physical space for these activities is hard on the rest of the clinic, clients may come to appreciate the one-stop-shop approach where they can get all of their animal's needs met in a single visit. And if not in a single visit, the approach brings in clients who can be reminded about check-ups and a practice's standards of care. Repeated interaction in multiple aspects of an animal's life can be a good way to build relationships with clients.

Lastly with regard to the VMG data, the support staff leverage ratio bounces around a bit but appears to reach middle ground slightly above 3.5 support staff per veterinarian. This ratio is lower compared to other practice statistics, but that is most likely accounted for by the differing composition of practices in each sample.



Source: Katz, Sapper and Miller and the Veterinary Management Groups

Figure 43

PRACTICE MANAGEMENT CONTINUING EDUCATION

Recent survey results, such as in the AVMA and AABP studies, reveal that at the time of graduation most veterinarians desire additional education to help prepare them to be better business managers. Specifically, 27 percent of the AABP survey respondents expressed that they desire more lessons in business finance, 21 percent in human resources management, and 17 percent in managerial business analysis.

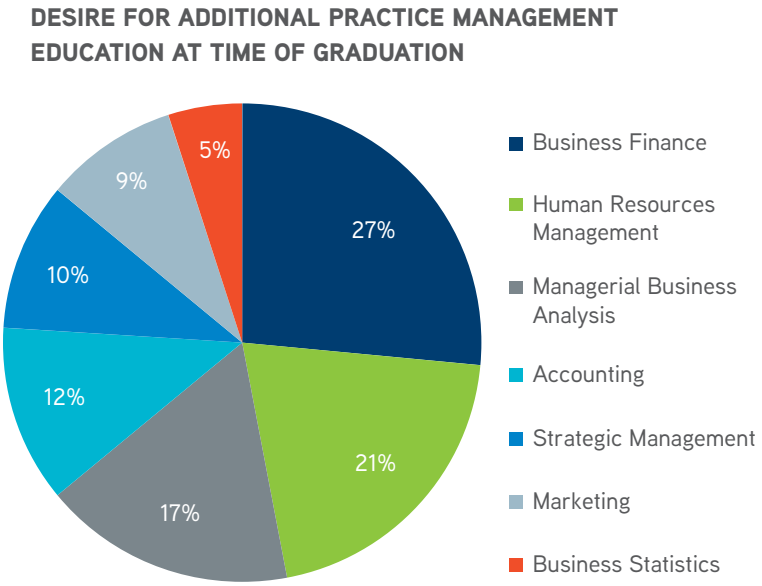
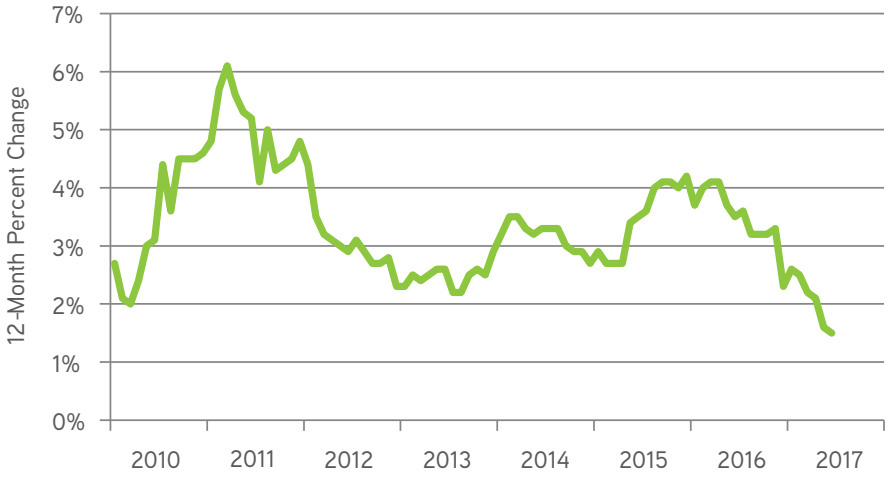


Figure 44

DISCUSSION

The cost of veterinary care to consumers is rising much faster than inflation, though this trend has shown signs of slowing in recent years.

VETERINARY SERVICES PRICE INDEX, MONTHLY, 2007-2017



Source: U.S. Department of Labor, Bureau of Labor Statistics

Figure 45

This increase in prices has correlated with a long-term decline in the proportion of pets visiting a veterinarian for yearly check-ups.

VETERINARY SERVICES PRICING AND PATRONAGE TRENDS, 1985-2016

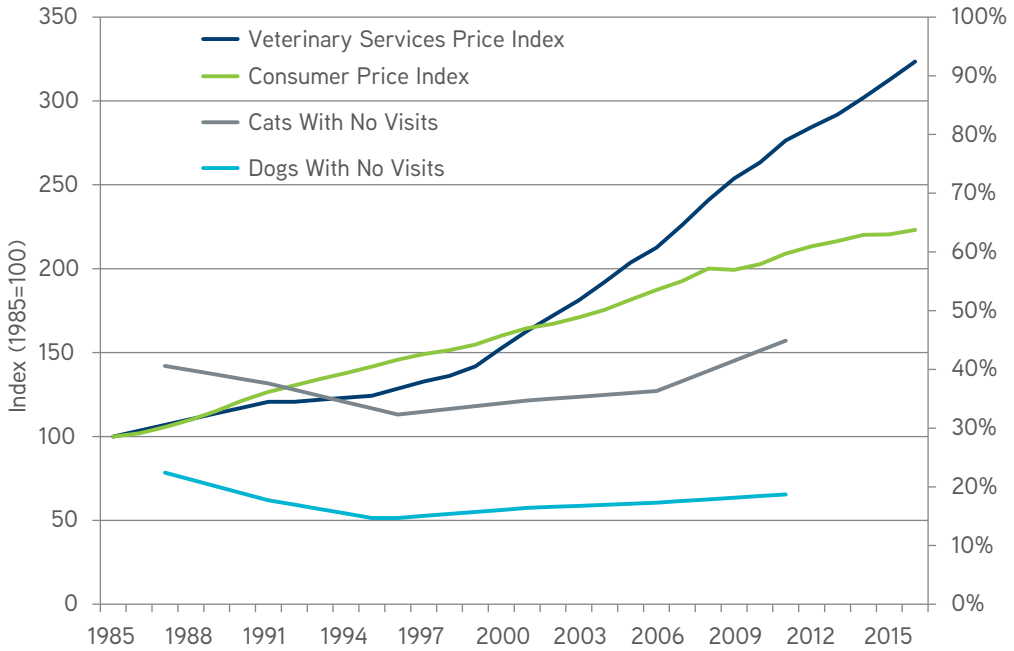


Figure 46

In more recent years, this trend has continued, with a continuing decline in the number of pets visiting veterinarians, and an increase in the cost per visit, or amount of each invoice from veterinary clinics.

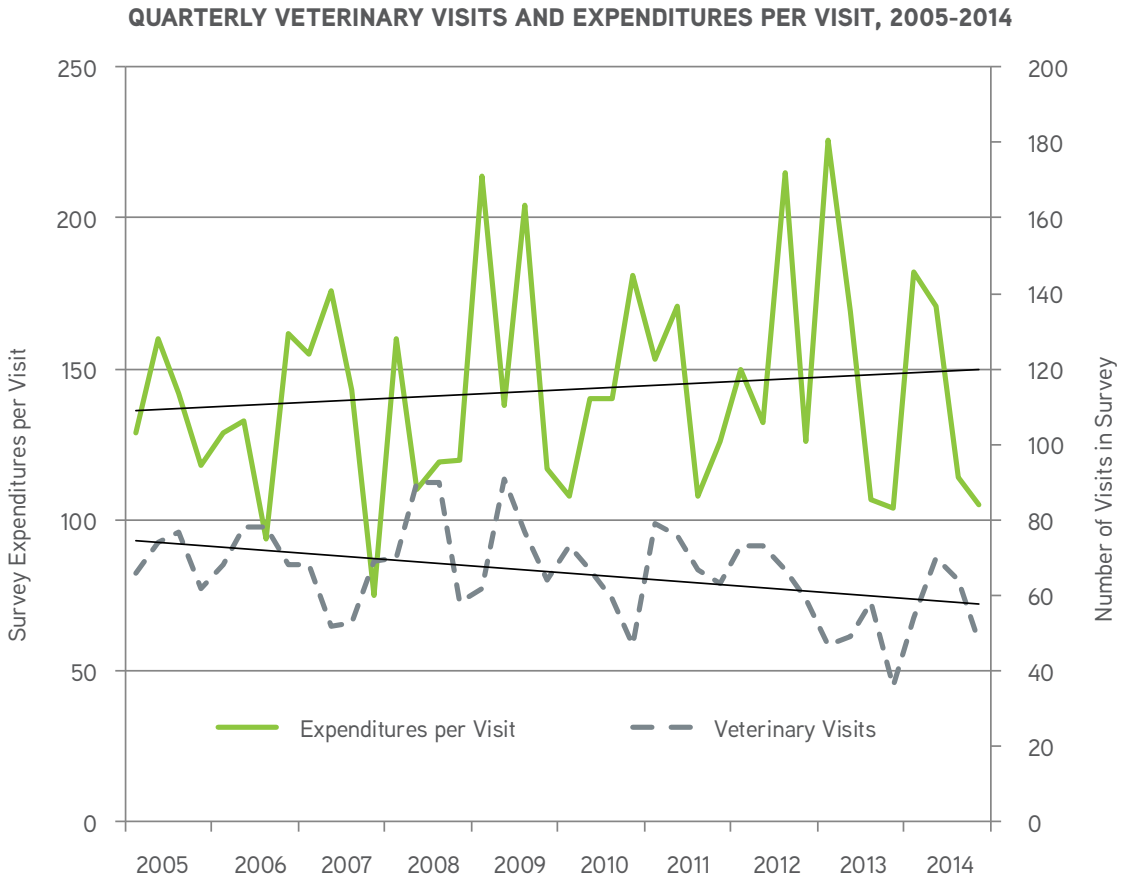


Figure 47

This long-term trend of price increases should concern veterinarians who rely on consumers of veterinary services to provide a customer base. To an extent, veterinary care beyond a bare minimum is often viewed as a luxury service. This means that as prices increase, it will be the case that a smaller and smaller proportion of the U.S. population will purchase veterinary care, and among those who do purchase veterinary care, a greater number could elect cheaper options for purchasing veterinary services. Because of the possible implications to the bottom line of veterinary clinics and the potential effect on public health (e.g., lack of vaccinations), it is important to understand why the cost of veterinary care is rising.

A recent study by researchers from the National Bureau of Economic Research, titled, "Is American Pet Health Care (Also) Uniquely Inefficient?" concluded that the rising cost of human healthcare is mirrored by the rising cost of pet healthcare, indicating the increases are likely caused by the same problem, but which is not associated with the widespread use of health insurance.

So what is the common factor driving up the price of pet and human healthcare? First, let's break down the costs of running a veterinary practice into two categories: operating expenses and profits. The common practice in the veterinary industry is to measure profit using EBITDA.

Then, further break down operating expenses into two categories: cost of labor and direct costs. The cost of labor refers to both DVM labor and support staff, while direct costs involve fixed costs and variable costs. Fixed costs are those that do not change according to the number of clients seen or procedures performed, such as the cost of a building (mortgage or rent), utilities, and the costs of durable

equipment and instruments. Variable costs, on the other hand, are those that increase or decrease with each transaction, for example, disposable medical supplies such as gloves, sutures and syringes, and the cost of prescription medication.

Now consider that the cost of labor and pharmaceuticals make up approximately 70 percent of practice expenses. Because these costs are increasing, so too must the cost of care.

Why is the cost of labor increasing? Much of it is driven by the labor market: the market for veterinarians.

Expenditures per visit are increasing while the number of visits per household is decreasing. So, while EBITDA is increasing, this ratio indicates that a smaller and smaller share of households is contributing a larger and larger percent to the profitability of veterinary practices.

VETERINARY PHARMACEUTICAL PRICE INDEX, 1999-2016

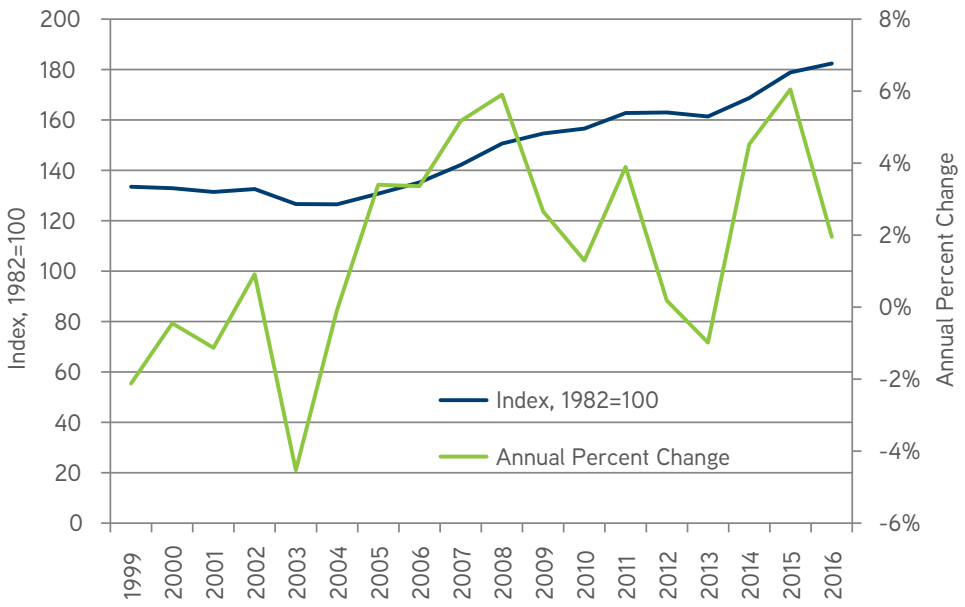


Figure 48

Veterinarians are working and earning more income overall, but are also working longer hours. In recent years, this pattern has pushed down the hourly pay of veterinarians. For new graduates, starting salaries continue to increase, though the actual effect on their wage rate per hour is unknown. A small part of these price increases are due to inflation. The vast majority of the increases, however, are most likely linked back to the market for veterinary education, in which the cost to obtain a veterinary medical degree has jumped in recent years.

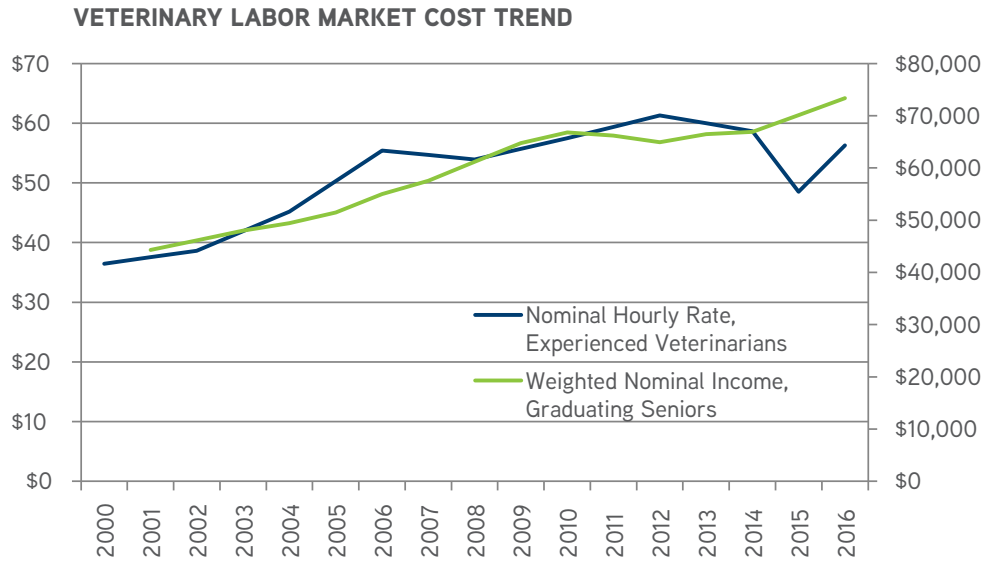


Figure 49

Consider that if the cost of veterinary care to the consumer is rising at some rate of percent per year, and is composed of 40 percent labor and 30 percent pharmaceuticals, what must be happening to the other 30 percent of costs? According to the VMG data, EBITDA levels are increasing, at least for the segment of hospitals organized into VMG groups.

The conclusion: The cost of veterinary care is rising because of the increase in the costs of both labor and supplies, but profit margins are also rising.

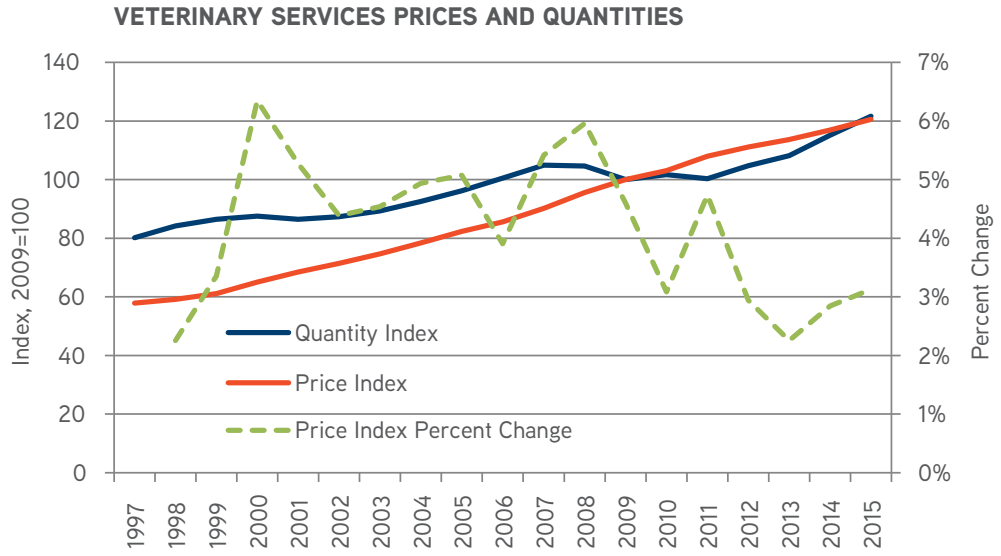


Figure 50

Recent data show that increases to prices paid by consumers of veterinary services have continued at a slower pace in the past few years, and have correlated with a sharp increase in the quantity of veterinary services provided. Hopefully, this trend will continue, and a decoupling of prices will emerge between the markets for human medical services and that of veterinary services.

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This report summarizes the economics and finance research presented at the annual AVMA Economic Summit and provides information about general U.S. economic conditions and the markets for veterinary education, veterinarians and veterinary services, and the performance of veterinary practices.

The AVMA & AAVMC Report on the Market for Veterinary Education:

The market for veterinary education is the beginning of the pipeline to the market for veterinary services. This report examines the characteristics of veterinary college applicants, the supply of and demand for veterinary education, and the performance of the market in providing new veterinarians.

The AVMA Report on the Market for Veterinarians:

This report explores the demographics and employment of the veterinary profession: where they are located, what type of work they do, how much they are compensated, and how they are managing their educational debt. The report also measures unemployment and underemployment and identifies the contributing factors, and explores the performance of the market based on the value of the DVM degree.

The AVMA Report on the Market for Veterinary Services:

All demand for veterinarians and veterinary education begins with the demand for veterinary services. This report provides the latest information on the price of veterinary services, price and income elasticity, and the financial performance of veterinary practices. Our forecasts of capacity utilization and excess capacity for regions and types of practices provide an indication of the performance of this market.

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