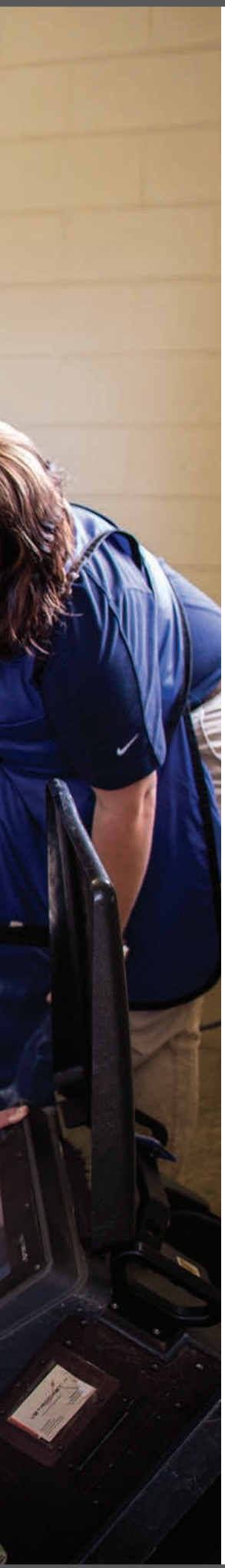
2017 AVMA Report on

# THE MARKET FOR VETERINARIANS

AVMA Veterinary Economics



2017 AVMA Report on

# THE MARKET FOR VETERINARIANS

Veterinary Economics Division
American Veterinary Medical Association
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# CONTENTS

# LIST OF FIGURES AND TABLES

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# SUMMARY

The market for veterinary labor continued to gain ground in 2016 and nationally is hitting on all cylinders. But there are still considerable maldistribution problems that are creating variations in unemployment, underemployment, incomes, wellness and other labor market indicators such as the net present value of the DVM degree. These variations occur regionally, by state and within states, by gender and by practice type. And the continued increasing scarcity of veterinary labor should help to ameliorate this maldistribution. A compilation of key indicators by region is provided at the end of this summary.

While the number of new veterinarians entering the workforce is nearly 4,500 per year, the number leaving is nearly 2,000, for a net gain of roughly 2,500. The current number of active veterinarians is estimated at approximately 108,000 and thus there are roughly 3,300 people per veterinarian in the United States. At the rate of current population growth and growth in the number of veterinarians, however, only 2,400 new people are being added for every new veterinarian. More importantly, while the cost of veterinarians continues to rise, the median household income of the increased population is not expanding.

The recent economic expansion has maintained a low unemployment rate in veterinary medicine and the changing structure of the veterinarian workforce has helped to create an even larger negative underemployment rate. The larger number of graying veterinarians coupled with the increased number of women in the profession is reducing the number of hours in a veterinary FTE and this has led to an actual reduction in the total number of veterinary FTEs, even while the number increases.

The number of jobs exceeded the number of applicants on the AVMA's Veterinary Career Center (VCC) in 2016 but there were still markets where the number of applicants exceeded the number of jobs by more than 10:1; in other markets employers went begging for applicants and found none. This disparity led to sharply rising veterinary incomes in some areas with no growth in incomes in other areas.

Veterinary wellness, talked about throughout the profession with major concern, does not appear different from other specialized professions, such as medical doctors, engineers and lawyers, when assessed through the ProQoL tool that measures compassion fatigue. As such, this tool might not be the correct one to measure veterinary health, particularly since it describes a portion of the profession that registers in the high end of burnout and secondary traumatic stress.

Because the market for veterinarians sits as the crossroads of the market for veterinary services – which drives the demand for veterinarians – and the market for veterinary education – the source of the pipeline of veterinarians – the market is affected by, and is responsive to changes in these two vertically related markets. Problems in either market become problems in the market for veterinarians and this leads to inefficiency in the market until adjustments are made.

Market adjustments occur when the market players make informed decisions. The purpose of this report is to enhance the decision-making process by providing the best information available for veterinarians to tap for employment and career decisions. Toward this end, those who complete AVMA surveys enable the collection and analysis of data to report on the markets, providing invaluable information to assist veterinarians. These obliging professionals are the source of change in the profession.

## SNAPSHOT OF VETERINARY PROFESSION BY REGION

| Region Of Workplace | Statistic | Change In Hours Desired | Total Personal Income |
|---|---|---|---|
| 0 | Mean | -.6525 | $78,567.66 |
| | N | 118 | 669 |
| | Std. Deviation | 22.60479 | $410,199.69 |
| 1 | Mean | -3.7900 | $110,925.56 |
| | N | 70 | 182 |
| | Std. Deviation | 20.21163 | $78,633.38 |
| 2 | Mean | -3.8846 | $109,468.58 |
| | N | 78 | 264 |
| | Std. Deviation | 17.55195 | $169,859.44 |
| 3 | Mean | .3483 | $97,563.48 |
| | N | 89 | 257 |
| | Std. Deviation | 20.63597 | $68,488.24 |
| 4 | Mean | -6.2188 | $106,840.41 |
| | N | 64 | 205 |
| | Std. Deviation | 16.76705 | $154,861.27 |
| 5 | Mean | -4.6290 | $83,577.57 |
| | N | 62 | 152 |
| | Std. Deviation | 19.47528 | $56,752.28 |
| 6 | Mean | -3.2155 | $96,239.16 |
| | N | 58 | 196 |
| | Std. Deviation | 21.61447 | $77,253.60 |
| 7 | Mean | -8.3658 | $138,455.14 |
| | N | 149 | 504 |
| | Std. Deviation | 18.58296 | $251,928.32 |
| 8 | Mean | -7.3462 | $114,760.18 |
| | N | 130 | 364 |
| | Std. Deviation | 18.48453 | $105,342.24 |
| 9 | Mean | -4.1705 | $96,585.41 |
| | N | 88 | 291 |
| | Std. Deviation | 20.89257 | $71,295.60 |
| Outside the United States | Mean | 3.0556 | $90,521.71 |
| | N | 9 | 24 |
| | Std. Deviation | 28.63394 | $77,875.41 |
| Total | Mean | -4.4009 | $103,611.86 |
| | N | 915 | 3108 |
| | Std. Deviation | 19.96571 | $232,265.46 |

Table 1

| Burnout Score | Unemployed In Veterinary Medicine | S/D Ratio (Externally Sourced) | Years Of Experience Of Respondent | Percentage Female |
|---|---|---|---|---|
| 23.4686 | 3.6% | 0.495 | 21.5725 | 55.2% |
| 542 | 14 | | 669 | |
| 7.87013 | | | 18.06996 | |
| 26.5220 | 3.9% | 0.474 | 14.7473 | 66.5% |
| 182 | 8 | | 182 | |
| 6.56687 | | | 12.37588 | |
| 25.9470 | 2.1% | 0.614 | 13.7045 | 70.5% |
| 264 | 6 | | 264 | |
| 6.81177 | | | 11.39558 | |
| 26.2724 | 2.7% | 2.079 | 12.8949 | 73.7% |
| 257 | 8 | | 257 | |
| 6.37161 | | | 11.70906 | |
| 26.1268 | 3.1% | 0.792 | 14.1073 | 71.2% |
| 205 | 7 | | 205 | |
| 6.60463 | | | 11.98521 | |
| 26.3750 | 3.9% | 0.739 | 12.2500 | 68.4% |
| 152 | 7 | | 152 | |
| 5.60725 | | | 11.30449 | |
| 25.9337 | 2.9% | 0.762 | 12.9031 | 62.6% |
| 196 | 6 | | 196 | |
| 6.05282 | | | 11.64456 | |
| 24.5805 | 1.1% | 1.088 | 19.0516 | 58.3% |
| 503 | 6 | | 504 | |
| 6.44537 | | | 14.45530 | |
| 25.9176 | 1.8% | 0.489 | 15.1978 | 69.7% |
| 364 | 7 | | 364 | |
| 6.29214 | | | 12.08393 | |
| 26.7869 | 2.5% | 0.401 | 11.9072 | 75.9% |
| 291 | 8 | | 291 | |
| 6.49795 | | | 10.40963 | |
| 28.0000 | 18.9% | | 11.9583 | 65.2% |
| 24 | 7 | | 24 | |
| 6.10773 | | | 11.70834 | |
| 25.4570 | 2.7% | 0.780 | 16.1573 | 65.6% |
| 2980 | 84 | | 3108 | |
| 6.78177 | | | 14.15599 | |

## REGIONS OF THE UNITED STATES

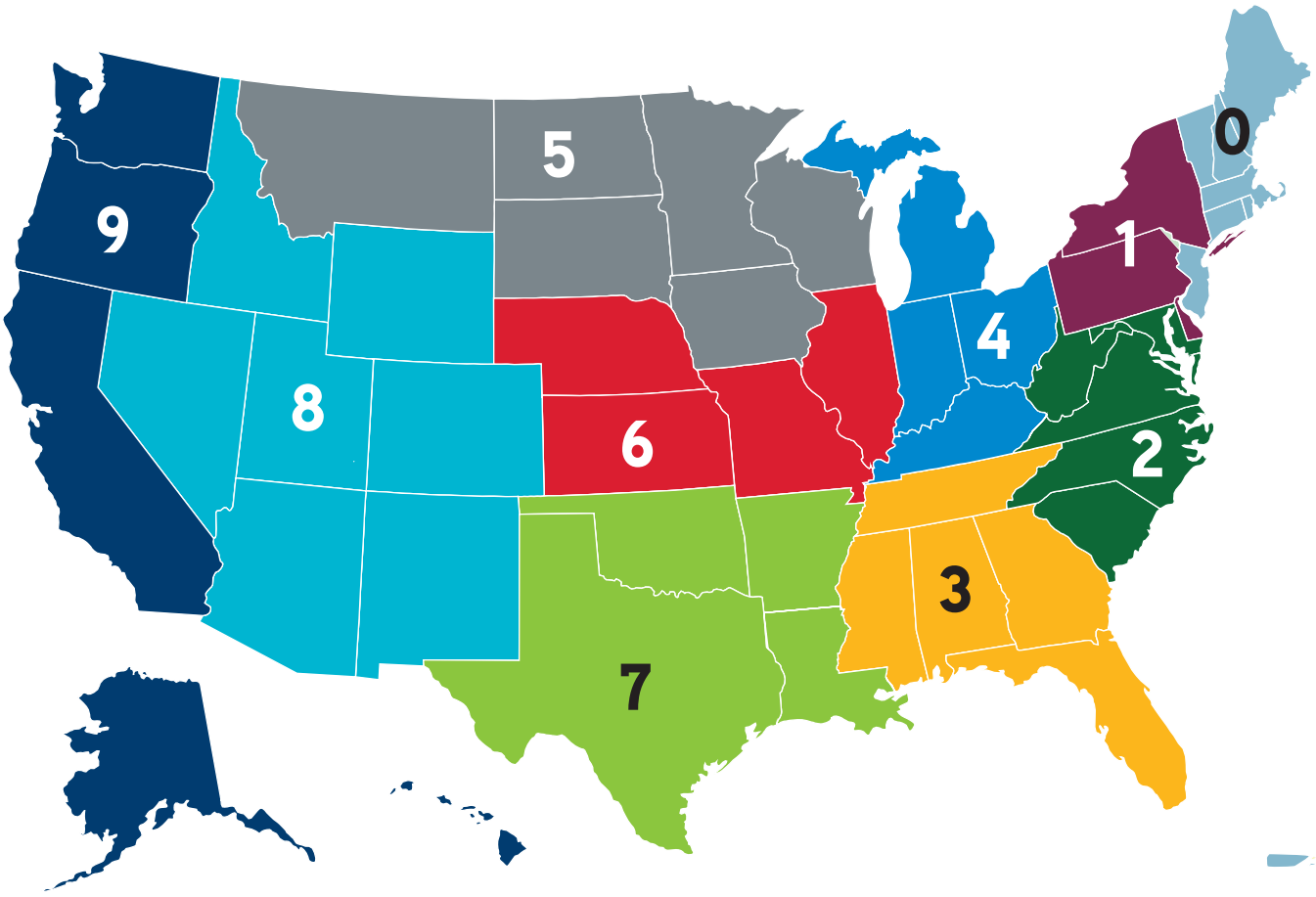


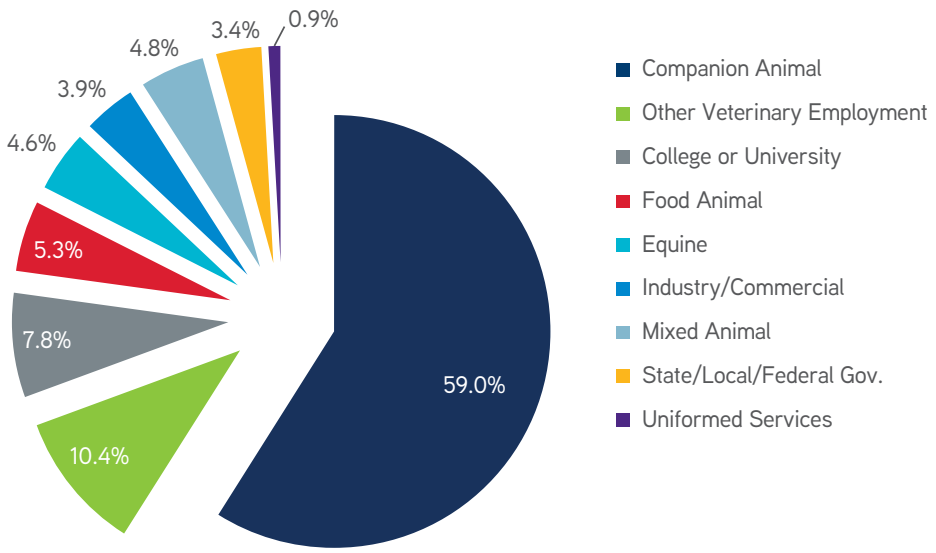

Figure 1

# INTRODUCTION

For the third year in a row, the market for veterinarians is increasingly robust with declining levels of unemployment, increasing levels of negative underemployment, larger year-to-year increases in mean starting salaries and the number of graduates who have obtained full-time employment prior to graduation, and an increasing number of employment postings on the AVMA Veterinary Career Center. In fact, for the first year since 2008, the number of employment opportunities posted on VCC exceeded the number of applicants, with many of these opportunities remaining unfilled through the end of 2016.

The market for veterinarians is the market of convergence between the market for veterinary education and the market for veterinary services. In this market, the equilibrium price and quantity in the market for veterinary services collides with the price and quantity equilibrium from the market for veterinary education. The number of veterinarians produced by veterinary colleges at a specific cost per veterinarian should confront an income offered by employers that is derived from the willingness of animal owners to purchase veterinary services from veterinary hospitals. This juxtaposition of the cost of veterinarians with the value of services perceived by animal owners, however, presumes that veterinary practices are able to translate the demand for veterinary services into the value accorded the veterinarian producing these services. Unfortunately, few veterinary practices use the value of output per veterinarian to establish veterinary incomes. And even fewer owners understand the relationship between price of services, quantity of services demanded and veterinary incomes. While all three veterinary markets (education, veterinarian, and veterinary services) will rarely, if ever, have equilibriums that are in alignment, the markets should tend to induce resources to move in the direction of the equilibrium prices and quantities. That is, in each of the markets, movement of resources should occur to produce a quantity

**VETERINARY POPULATION, 2016**




Estimated number of veterinarians as of December 31, 2016: 107,995

Figure 2

of output that just meets quantity demanded at a price that is acceptable to both consumers and producers.

In 2016 there were an estimated total of roughly 107,995 veterinarians actively engaged in the profession, in public or private practice, and roughly 17,000 veterinary students in the pipeline to become veterinarians. The largest segment of the profession is engaged to provide medical services to animals in private and corporate practices. Of these practices, companion animal practices employed the largest number of veterinarians (59 percent), followed by food animal (5.3 percent), equine (4.6 percent) and mixed animal practices (4.8 percent). In public practice, colleges and universities employ the most veterinarians, followed by industry, and state and local governments.

The percent of veterinarians identifying their practice type as companion animal in 2016 continues to decline, while those identifying food animal, mixed animal and equine as their practice type increased, and a substantial increase occurred of those who selected "other" as their employment type.

The national market for veterinarians remains robust for the second straight year. The single largest source of the continued improvement in the market for veterinarians has been the growth in the U.S. economy. And, because the growth in the U.S. economy has not occurred uniformly in all sectors of the economy, and those sectors are not uniformly distributed throughout the United States, the economic improvement has not occurred uniformly throughout the country. As such, veterinary markets might not be robust locally or in every practice type. To the extent that veterinarians are mobile, both in location and practice type, the differences in the market that occur as a result of maldistribution should be self-corrective. Lower-income, unemployed or underemployed veterinarians would, in a competitive market, relocate to seek higher-paying employment opportunities. To the extent that mobility is constrained as a result of licenses, experience, technical skills, living costs and/or family situations, the variations in incomes will persist.

In 2015, the unemployment rate in veterinary medicine (4.5 percent) remained below the national average and was not significantly different from 2014. To better align with the national unemployment statistics, however, new questions were added to the 2016 Census of Veterinarians Survey. Controlling for retirement (48.2 percent) and a return to education (12.9 percent) when estimating unemployment for those who were actively seeking employment but had not found work (38.8 percent), the unemployment rate in veterinary medicine that is comparable to the national unemployment rate was actually 1.7 percent in 2015.

Underemployment was again negative in 2015, with more veterinarians indicating they wish to work fewer hours for less compensation than those who wish to work more hours for more compensation. The total number of veterinarians that would be required to eliminate the negative underemployment was 3,391 (40 hours per week equals one FTE). Of course, the indivisibility of labor makes eliminating the negative underemployment difficult, as few veterinarians will wish to work the 5-10 hours per week in several practices that would be required, because underemployment – both positive and negative – occurs in small numbers of hours distributed throughout the nation and across practice types.

The ability of markets to adjust depends on information. Veterinarians will not relocate or change career paths without knowledge of the benefits that can be accrued as a result of the move. For this reason, the AVMA's Veterinary Economics Division is providing "salary calculators," tools that provide the relative importance of various demographic factors in determining veterinary incomes. Of course, these are mean incomes and a great deal of variation in income remains unaccounted for by the factors in the model. Some of these factors are unique to the individual, such as personality, lifestyle and energy level.

AVMA's Veterinary Economics Division is also developing a geographical information system tool to identify "hot" and "cold" markets for veterinarians to help new veterinarians and those who desire a change in their current employment gain a better picture of the spatial variations in the markets for veterinarians. To the extent that the constraints to mobility allow, the availability of this information to the profession should reduce the income difference between veterinarians over time and also diminish the time required for those changes to occur.

# NATIONAL LABOR MARKETS

**As the demand for goods and services throughout the economy increases, firms will hire new labor to produce the new output needed to meet this demand.**

The market for veterinarian labor is connected through price to all other labor markets. Increases in the demand for veterinarians, in theory, should move in the same direction as the national level of demand for labor. As the demand for goods and services throughout the economy increases, firms will hire new labor to produce the new output needed to meet this demand. The number of jobs (people employed) will rise, and unemployment will fall. Thus, national employment estimates from the Bureau of Labor Statistics (BLS) provide a good indicator for what might be happening in the market for veterinarians.

The Conference Board provides an indicator of the job market through their Help Wanted Online (HWOL) Data Series. Information about this series was provided in the *2016 AVMA Report on the Market for Veterinarians*.

The HWOL series (labor demand), in combination with the BLS measure of unemployment (labor supply), provides an overall picture of the U.S. labor market. The HWOL job listings began to decline in 2007 and reached a bottom in early 2009 and then showed continued growth until the fall of 2015. The number of jobs posted nationally peaked in November of 2015 at just more than 5.5 million and has declined since, reaching a low of just under 4.9 million jobs posted in May of 2016. Unemployment mirrored the trend in the HWOL data. The low point for unemployment occurred at the same time that the posted jobs in HWOL hit a high. Unemployment then began to climb and reached a peak at the same time that the number of jobs posted online hit the low point. Unemployment has declined continually since 2009, hitting a low of just under 7.8 million in January of 2016. As noted in the *2016 AVMA Report on Veterinary Markets*, these are important indications that the economy may have reached its zenith in the business cycle.

## U.S. LABOR AND SUPPLY DEMAND, SEASONALLY ADJUSTED

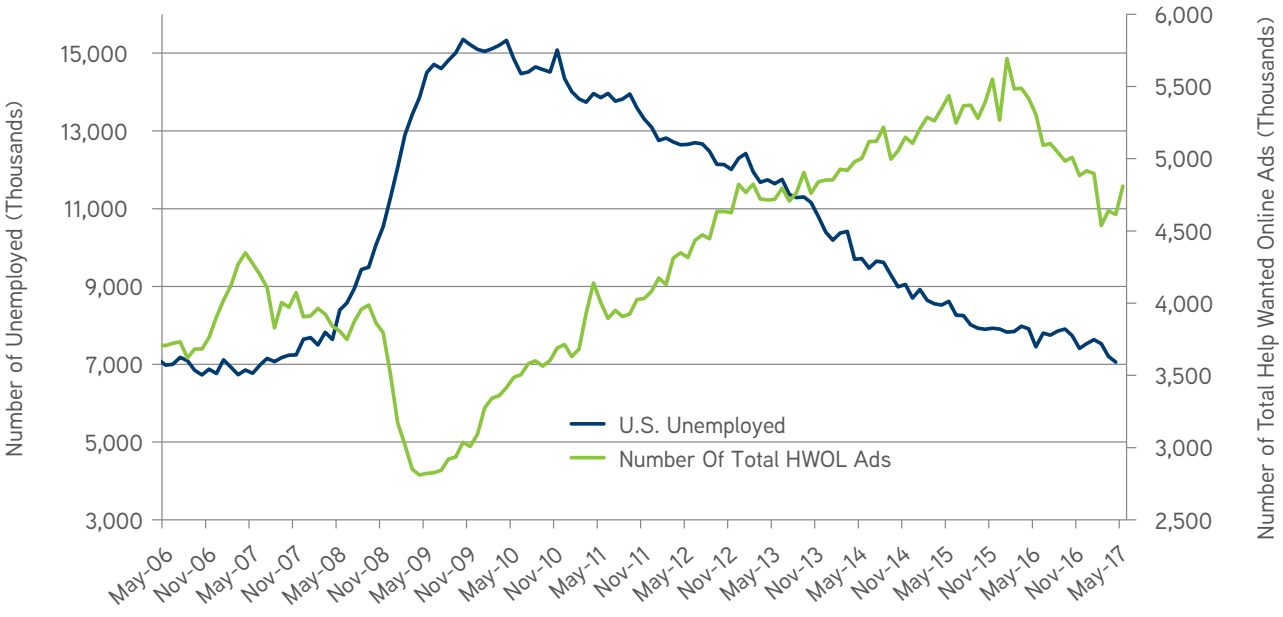



Figure 3

A simplified measure of the national labor markets is the supply/demand (S/D) ratio. The S/D ratio is the number of unemployed divided by the number of jobs posted online. The S/D ratio provides an indication of the general tightness of the national labor market and indicates the extent to which the national labor supply and demand is out of balance. At the height of the recession, there were more than five unemployed persons seeking each available employment opportunity. Relative scarcity of labor was very low, and wage growth suffered. The S/D ratio fell continuously since the last recession reaching a low of 1.38:1 in late 2015 but has shown an increasing trend through 2016 and is now roughly 1.5:1. This suggests that there are three unemployed persons for every two employment opportunities and thus the relative scarcity of labor is quite high compared to what it was in 2009. The declining S/D ratio, or increasing labor scarcity, should create increasing pressure on wage growth.

## S/D RATIO: JOB APPLICANTS TO AVAILABLE JOBS

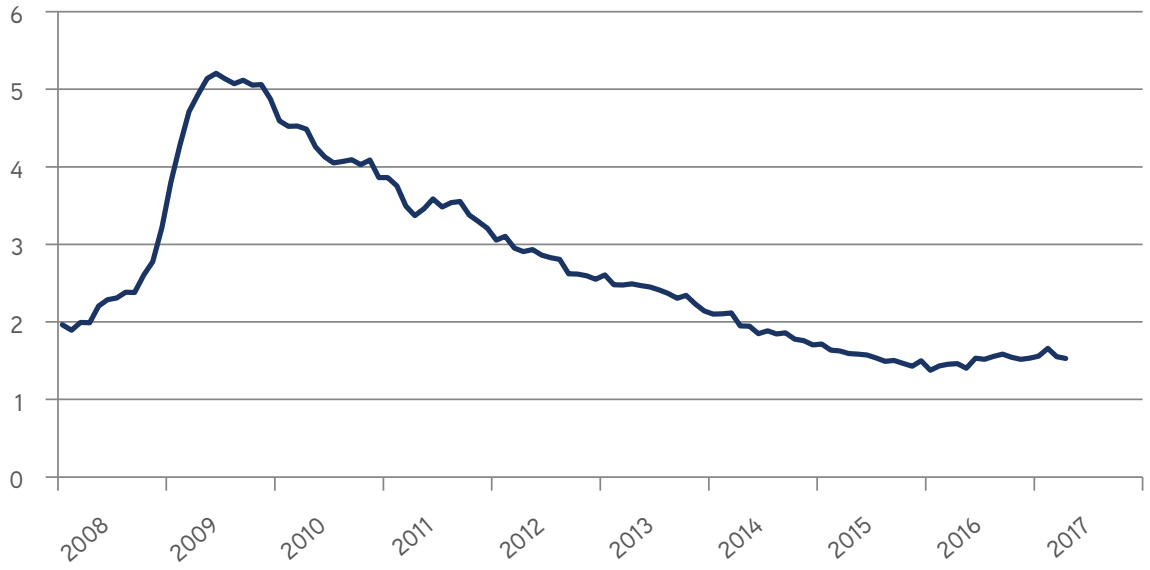



Figure 4

While providing an overall indicator of the national aggregate labor market, the S/D ratio may vary considerably by occupation and geographic location. Over time, the S/D ratios across regions and occupations would begin to equilibrate (become similar) if individuals were equally mobile, had information on all employment opportunities and there were no barriers to entry into the various occupations. In practice, none of these conditions hold and thus the S/D ratio maintains differences between occupations and locations even though all may change over time. The table below provides the S/D ratio for the 10 top occupations by posted jobs and the associated mean hourly wage rate for two different periods. In June of 2013, the national S/D ratio was 2.45:1, and, as noted earlier, the national S/D ratio is now approximately 1.5:1. For some of the occupations listed below, such as "Food Preparation and Serving Related," the S/D ratio declined substantially between the two periods but remained above the national average. For "Computer and Mathematical Science" and "Management," the S/D ratio increased between the two periods but remained far below the national average with the demand for employees exceeding the available pool of potential applicants. As a result of the differences in the changes in the S/D ratios, the wage rate changes between the two periods were considerably different as well.

### S/D RATIO AND WAGE RATES FOR HELP WANTED ONLINE, 2013 AND 2017

| | June 2013 HWOL | | May 2017 HWOL | |
|---|---|---|---|---|
| Occupation | Ratio | Mean Wage | Ratio | Mean Wage |
| Sales and Related | 1.54 | $18.37 | 1.57 | $19.50 |
| Computer and Mathematical Science | 0.17 | $39.43 | 0.29 | $42.25 |
| Office and Administrative Support | 1.75 | $16.78 | 1.37 | $17.91 |
| Healthcare Practitioners and Technical | 0.44 | $35.93 | 0.15 | $38.06 |
| Management | 0.77 | $53.15 | 0.78 | $56.74 |
| Transportation and Material Moving | 1.72 | $16.28 | 1.90 | $17.34 |
| Business and Financial Operations | 0.87 | $34.14 | 1.00 | $36.09 |
| Food Preparation and Serving Related | 3.45 | $10.38 | 2.76 | $11.47 |
| Installation, Maintenance and Repair | 0.94 | $21.35 | 0.74 | $22.45 |
| Education, Training and Library | 0.57 | $38.51 | 1.55 | $26.21 |

Table 2

The relationship between the S/D ratio and the wage rate can be illustrated by graphically comparing the points and finding the mathematical relationship (line). This relationship represented by the blue (2013) and red (2016) lines can be seen to have become steeper over the last three years. This implies that at higher wage rates, a small change in the S/D ratio results in a large increase in the wage rate.

**THE WAGE RATE AND S/D RATIO RELATIONSHIP**

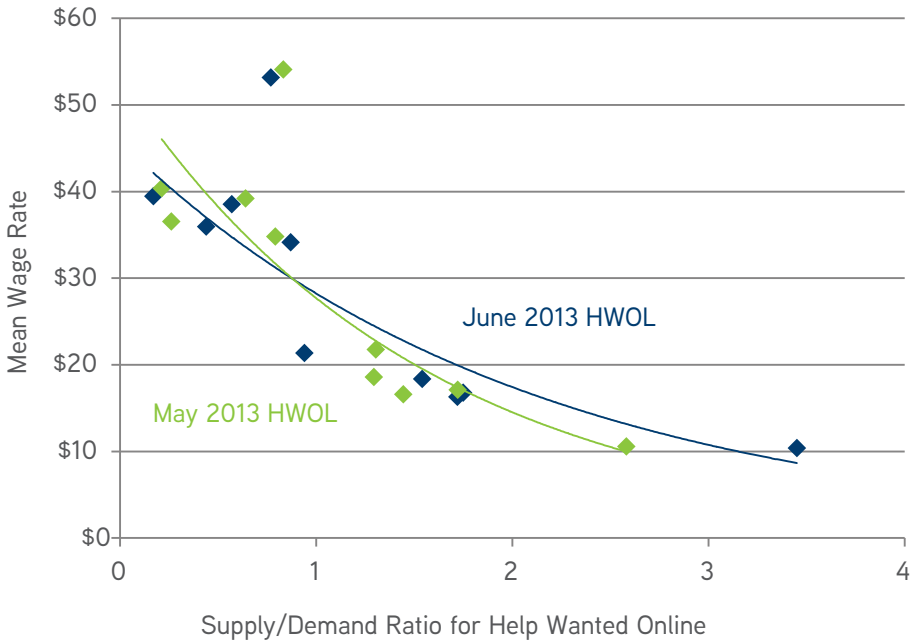



Figure 5

The market for veterinary labor can be compared to the national labor market through the use of the information collected on the AVMA's Veterinary Career Center with respect to posted employment opportunities and posted applications for employment.

From 2008 to 2016 we have plotted the employment opportunities and applicants posted monthly on the VCC site. Prior to the recession in 2008 and 2009 the number of employment opportunities exceeded the number of applicants. However, after the recession when the S/D national ratio hit a high of more than five applicants looking for every employment opportunity nationally, the number of applicants exceeded the number of employment opportunities for veterinarians nationally. While the national S/D ratio fell by half in 2012 (roughly 2.5 applicants for every job), in the veterinary profession the number of applicants per employment opportunities peaked and starting salaries for new veterinarians bottomed along with the percentage of graduates who were able to obtain full-time employment opportunities prior to graduation.

While the national S/D ratio hit a low point in 2016 (less than 1.5:1), the number of applicants for the available veterinary employment opportunities fell below one for the first time since before the last recession and new graduate starting salaries hit an all-time real income level along with a record number of new graduates finding full-time employment prior to graduation. The relationship between the national S/D ratio and the VCC applicant-to-jobs ratio suggests a lag time between the national labor market and the veterinary labor market. This agrees with economic theory. As the economy reaches a peak, inventories begin to accumulate and companies lay off workers. The national S/D would show fewer Help Wanted Online employment opportunities and the rising unemployment would produce more applicants. Over time, unemployment benefits and savings would dry up and pet-owning households would reduce their demand for veterinary services. As this demand declined, the number of employment opportunities would decline but the number of potential new employees would not. This process appears, from this data, to take three-four years to occur, and this information should help veterinary practices prepare for the next recession.

## VETERINARY CAREER CENTER JOBS AND APPLICANTS


Figure 6

Not all the employment opportunities on the VCC are for DVMs. Some of the opportunities are for the various staff positions in a veterinary hospital. More than 86 percent of the posted jobs do, however, require a DVM degree.

## VCC DESCRIPTIVE STATISTICS OF JOBS, 2016

| Education Level | Frequency | Percent |
|---|---|---|
| 2-year Degree | 378 | 3.2% |
| 4-year Degree | 151 | 1.3% |
| DVM or Equivalent | 10,420 | 86.9% |
| Doctorate | 214 | 1.8% |
| High School | 524 | 4.4% |
| Master's | 22 | 0.2% |
| Some College | 281 | 2.3% |
| Total | 11,990 | 100% |

Table 3

While the DVM is the predominant requirement for employment opportunities listed on the VCC and represents the predominant registered applicant looking for employment, the veterinarian comprised only 44 percent of the total number of registered users of the VCC in 2016[1]. Thus, there were roughly 10,420 DVM job postings that were seeking 3,422 applicants. In comparison to the S/D ratios of other professionals, this 0.33 S/D would suggest that the mean salary would be in the ballpark of $45-$50 per hour. Assuming an average hourly work week of 45 hours, the average salary of a veterinarian should be $105,000 to $117,000.

### VCC DESCRIPTIVE STATISTICS OF USERS, 2016

| Registered User | Experience Level of Registered User | | | | |
|---|---|---|---|---|---|
| | < 1 | 1 to 7 | 7 + | Any Level | Total |
| Veterinarian | 888 (35%/26%) | 1,529 (51%/45%) | 891 (49%/26%) | 114 (26%/3%) | 3,422 (44%) |
| Veterinary Student | 677 (26%) | 121 (4%) | 17 (1%) | 73 (17%) | 888 (11%) |
| Veterinary Technician | 253 (10%) | 620 (21%) | 410 (22%) | 40 (9%) | 1,323 (17%) |
| Not Listed | 729 (29%) | 725 (24%) | 518 (28%) | 215 (48%) | 2,187 (28%) |
| Total | 2,547 (100%) | 2,995 (100%) | 1,836 (100%) | 442 (100%) | 7,820 (100%) |

Table 4

A comparison of the U.S. S/D ratio and the VCC ratio illustrates a pattern that may suggest a long lag time between changes in the U.S. S/D and changes in the veterinary labor market. This will be an important relationship to observe over time to determine the exact relationship between the two series and how that relationship can be used by veterinary practices to minimize the impacts of a recession.

### VCC RATIO OF JOB APPLICANTS TO AVAILABLE JOBS

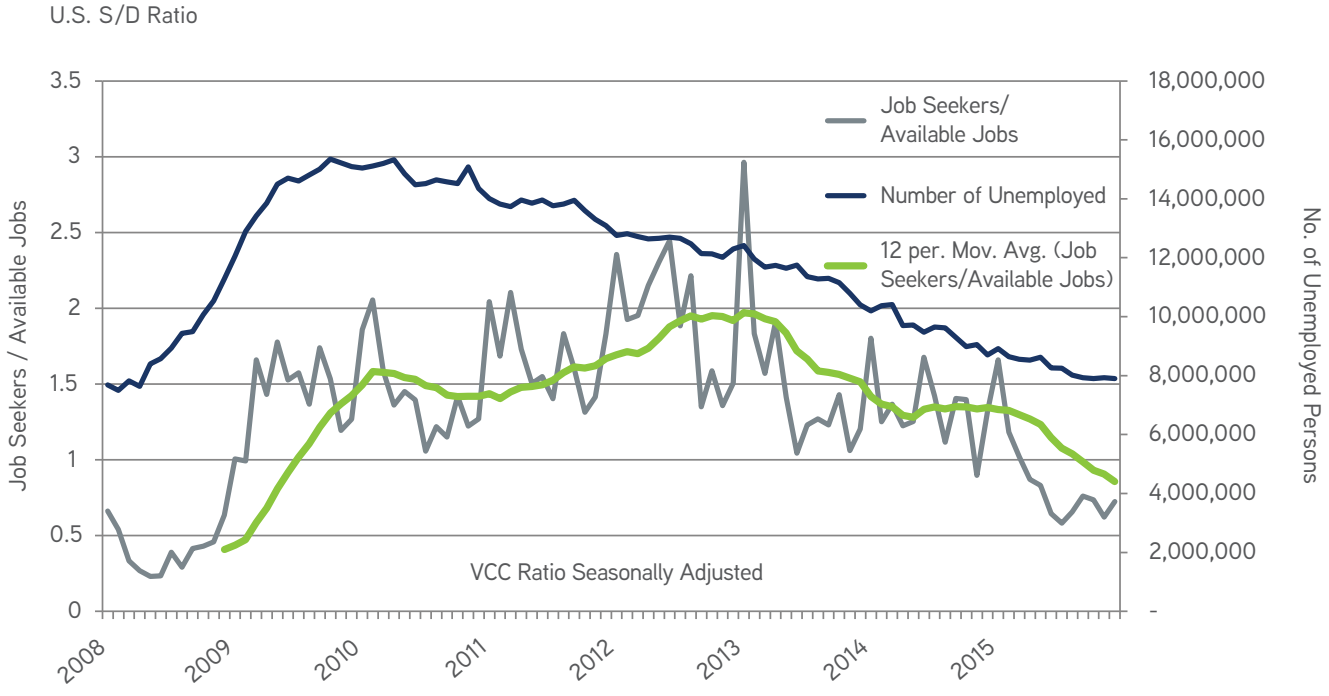



Figure 7

[1] The total column includes VCC-registered applicants who indicated their job level and experience level in the VCC database, and excludes those applicants who did not provide both types, or who provided neither type, of information.

## NATIONAL AND STATE VETERINARIAN MARKET

In 2015 and 2016, national surveys of the veterinary profession were conducted using an employment survey (2015), a compensation survey (2015), a practice-owners survey (2015) and the Census of Veterinarians (2016). At the same time that the national surveys were conducted by selecting a sample of the national population of veterinarians (AVMA members and nonmembers), surveys were also fielded from the populations of veterinarians from the American College of Laboratory Animal Medicine/American Society of Laboratory Animal Practitioners (ACLAM/ASLAP), American Association of Bovine Practitioners (AABP), American Association of Equine Practitioners (AAEP), and the states of Indiana, Texas, Colorado and Arizona. These state and practice-type association surveys were fielded in addition to the national surveys to assist in identifying the validity of the segmentation, by practice type and region, of the national survey information and to provide a more extensive look at the diversity of the profession. This section summarizes the initial findings of surveys. More extensive analysis is currently being conducted and the results of this analysis will be presented at the 2017 AVMA Veterinary Economic Summit, in the 2018 AVMA Economic Report series and through special reports for each of the associations.

The AVMA sample that received the surveys was a subset of the total veterinary population while the other samples were the actual membership of each of the associations. Thus, the response rates for the associations provide information on a much larger portion of their respective populations than does the AVMA response.

### SAMPLE SIZE AND RESPONSE RATES

| | Sample Size | Total Respondents | Rate of Response |
|---|---|---|---|
| AVMA - 2016 | 21,638 | 2,545 | 11.8% |
| Texas | 3,212 | 354 | 11.0% |
| Colorado | 1,408 | 133 | 9.4% |
| Arizona | 860 | 102 | 11.9% |
| Indiana* | 2,098 | 457 | 21.8% |
| AABP* | 4,573 | 934 | 20.4% |
| AAEP | 5,943 | 986 | 16.6% |
| ACLAM/ASLAP* | 2,503 | 855 | 34.2% |

***Data are from the AVMA:**
**-2015 Employment Survey**
**-2015 Compensation Survey**
**-2016 Census of Veterinarians**

Table 5

The demographics of each of the samples were compared starting with the year of graduation. The AVMA sample follows a distribution where the number of respondents increases as their year of graduation draws closer to the present. Of course, the number of new graduates per year has increased over time but was essentially flat during the 1980s and 1990s. And, the number of people who have left the profession as a result of retirement, change in profession, injury or death has increased with years in the profession. Thus, the largest segment of the veterinary population is the group of veterinarians who graduated during the period 2010 through 2015 and the smallest is the 1950s cohort. Distribution of age follows a similar pattern. Among the allied association survey populations, only Indiana and the AAEP samples follow a similar pattern. The differences in this pattern from those of the other associations could be a result of response bias or a reflection of the demographics of the association. If the latter is the case, the reasons for the variations need to be investigated.

## RESPONDENTS BY YEAR OF GRADUATION

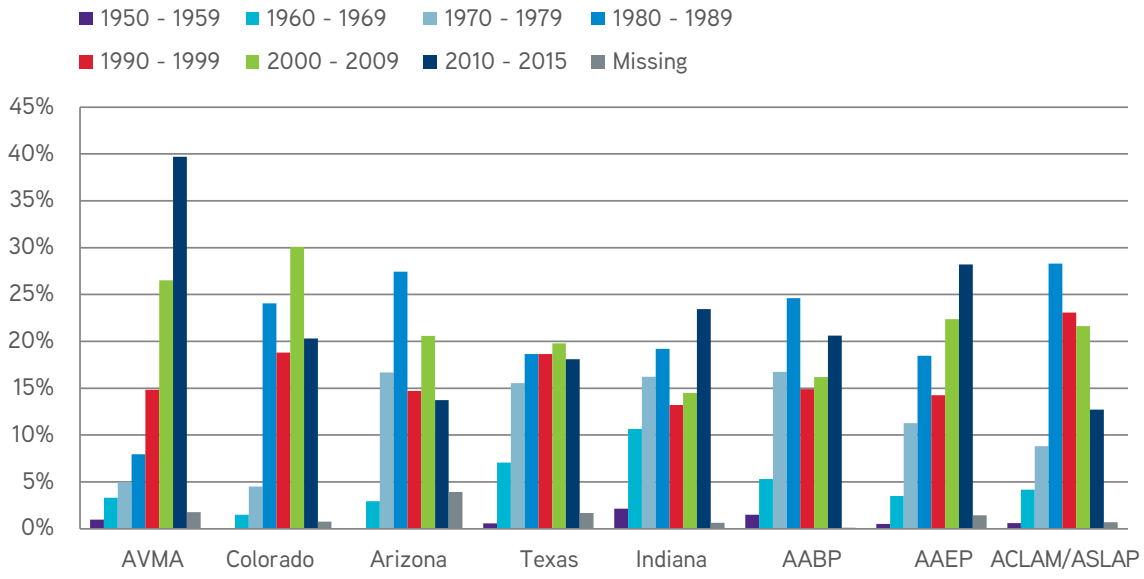



Figure 8

## RESPONDENTS BY AGE GROUP

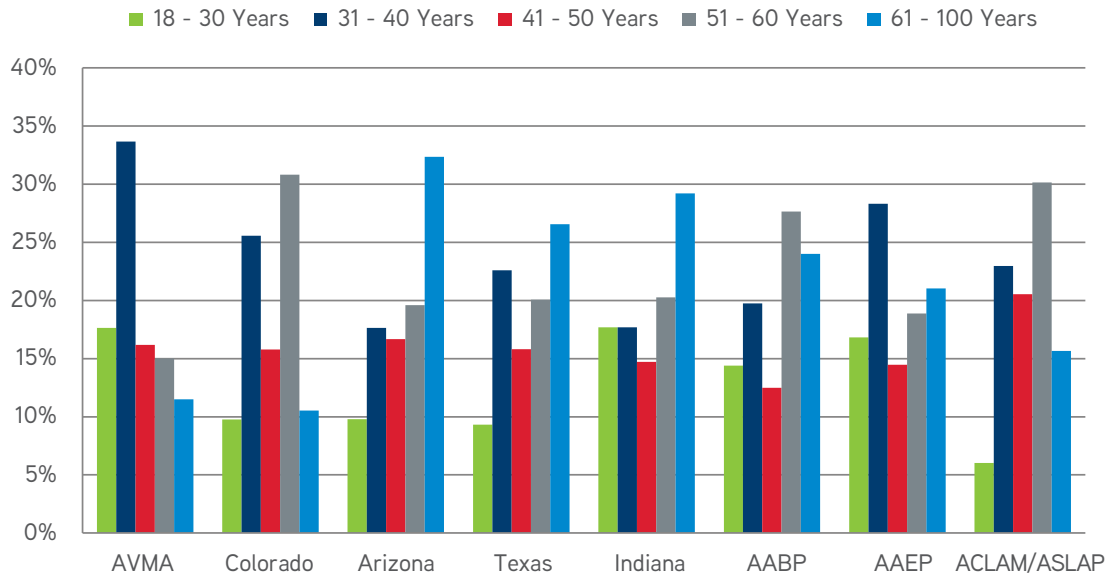



Figure 9

The variation in gender was also considerable across the various associations. While the gender distribution of the AVMA sample contains a higher percentage of women than is representative of the profession as a whole, and this difference requires the reweighting of the summary statistics (e.g., unemployment, underemployment), for the other associations, the gender distribution – as with the graduation year – might be due to sample response bias or actually reflect of the distribution. In either case, understanding the factors that contribute to either response bias or a difference in distribution should be evaluated.

**RESPONDENTS BY GENDER**

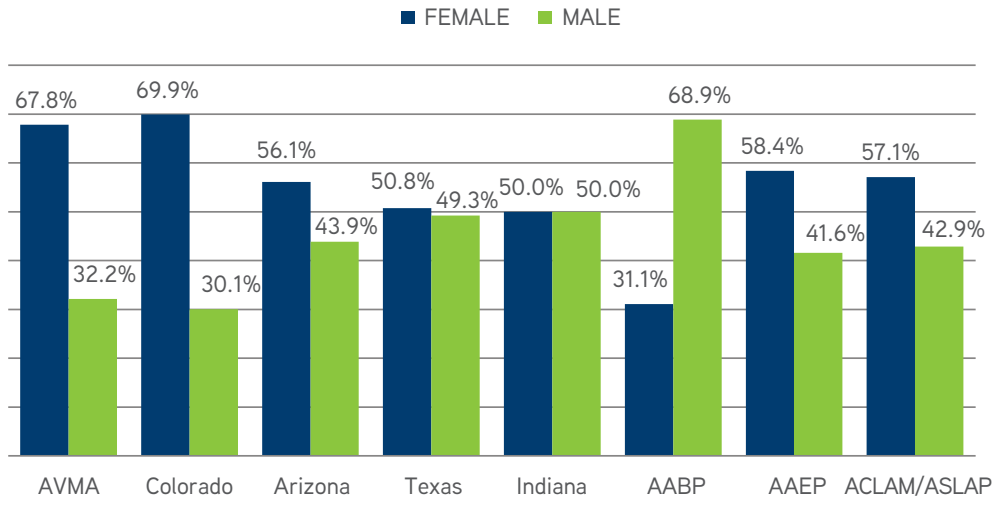



Figure 10

Nationally, 26 percent of Americans described where they live as urban, 53 percent said suburban and 21 percent said rural. The U.S. Census has no designation for "suburban," however, and the combined population of those indicating suburban or urban (81 percent) is equivalent to the census estimate that 81 percent of the population is urban.

For all samples of veterinarians except the ACLAM/ASLAP (ACLAM) sample the percentage of those responding that they practice in urban/suburban areas is less than the 81 percent noted by the U.S. Census. Indiana, AAEP and AABP were more strongly rural than the national populations or the other veterinary samples.

**RESPONDENTS BY TYPE OF COMMUNITY**

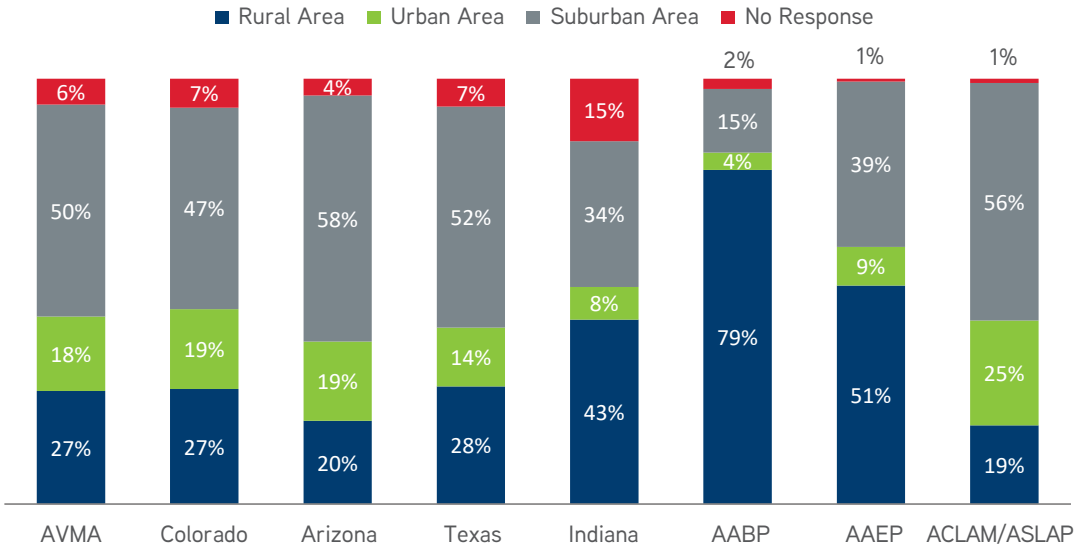



Figure 11

The distribution by practice type across the various samples indicates that for the nation and states there was little difference, with the majority (approximately 60 percent) of veterinarians involved in companion animal medicine and the next largest practice type being college or university workers (10 precent-20 percent). As might be expected, ACLAM/ASLAP was predominately in the college or university and industry practice types while AABP was predominately food and mixed animal and AAEP was predominantly equine or gave no response.

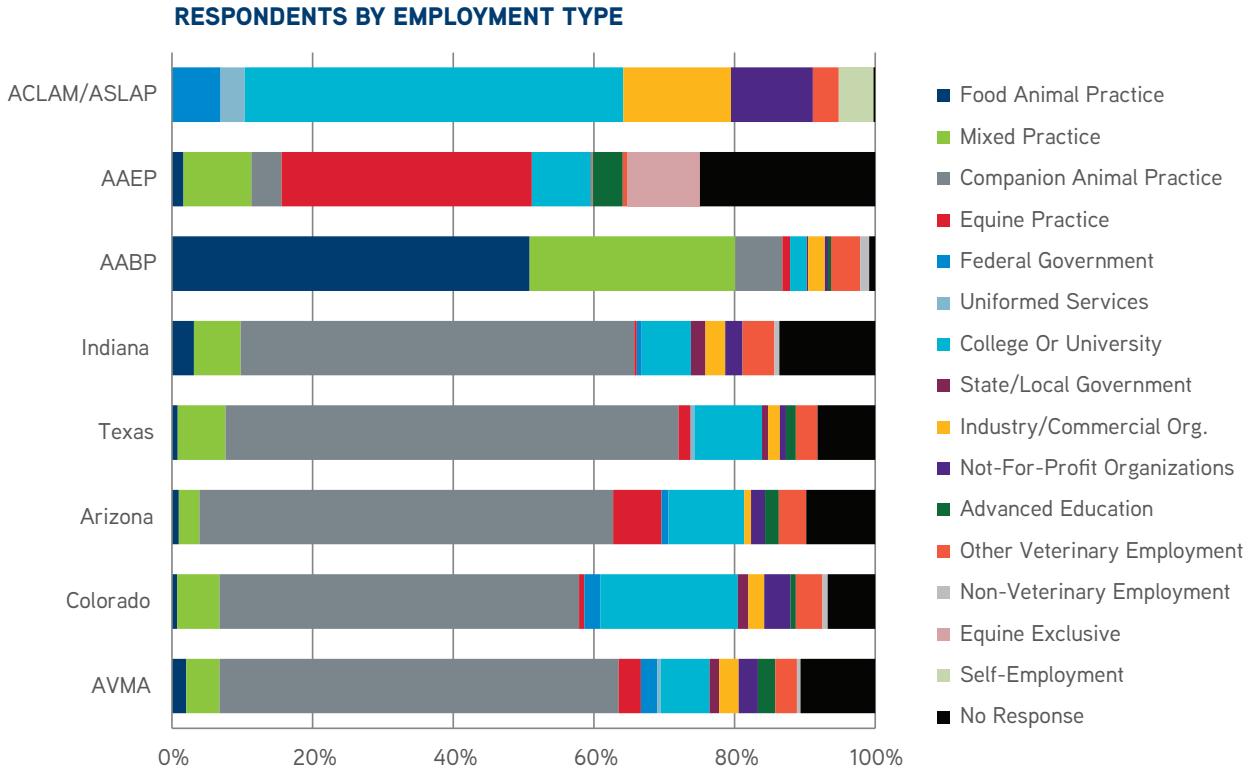
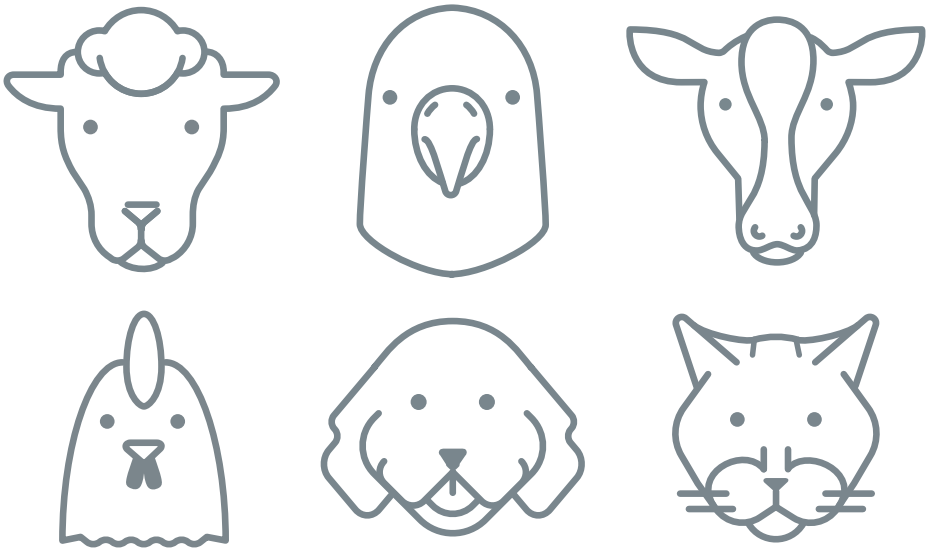



Figure 12




# VETERINARY INCOMES

## Incomes in 2016 across the various associations were fairly consistently distributed...

Incomes in 2016 across the various associations were fairly consistently distributed, with those making between $100,000 and $150,000 the predominant income group. In addition, except for the ACLAM sample, the distributions are skewed left, suggesting that the median income is to the left of the mean.

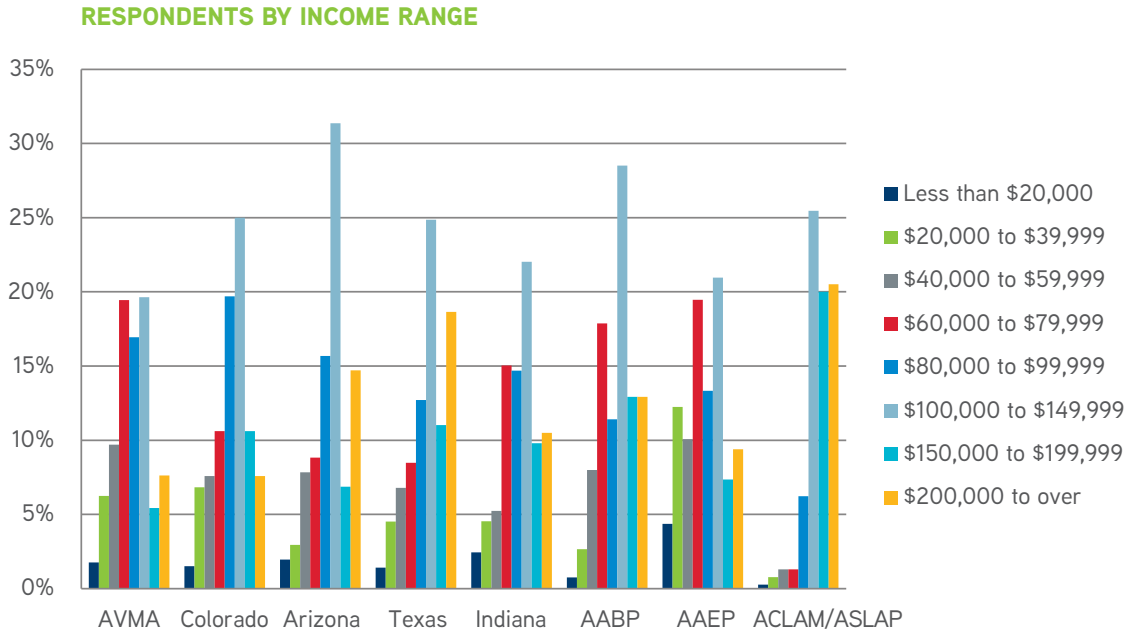


Figure 13

The income for the national sample varies by both graduation year and practice type. Figure 14 represents the mean income (points) by graduation year, as well as the range of incomes within one standard deviation of either side of the mean (line). Incomes increase with experience and the range of incomes also increases as experience increases for the first two decades post-graduation and then the mean income growth slows and declines along with the variation in income.

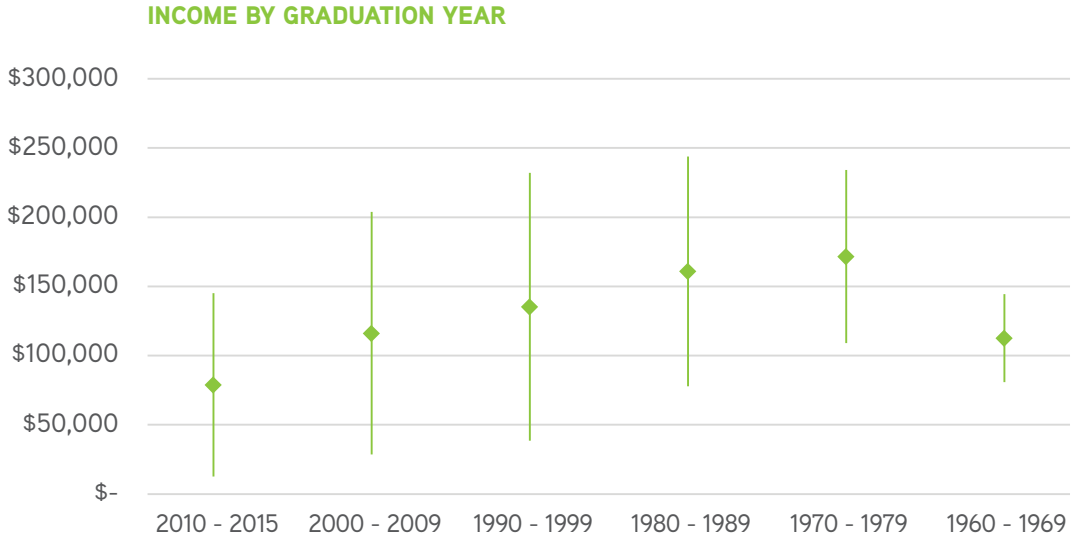


Figure 14

The difference in both mean incomes and the range of incomes within one standard deviation of the mean vary by practice type. Incomes for industry veterinarians has the highest mean income and along with companion animal medicine and college and university practice types has the greatest range of reported incomes within one standard deviation of the mean.

**MEAN PROFESSIONAL INCOME BY PRACTICE TYPE, 2016**

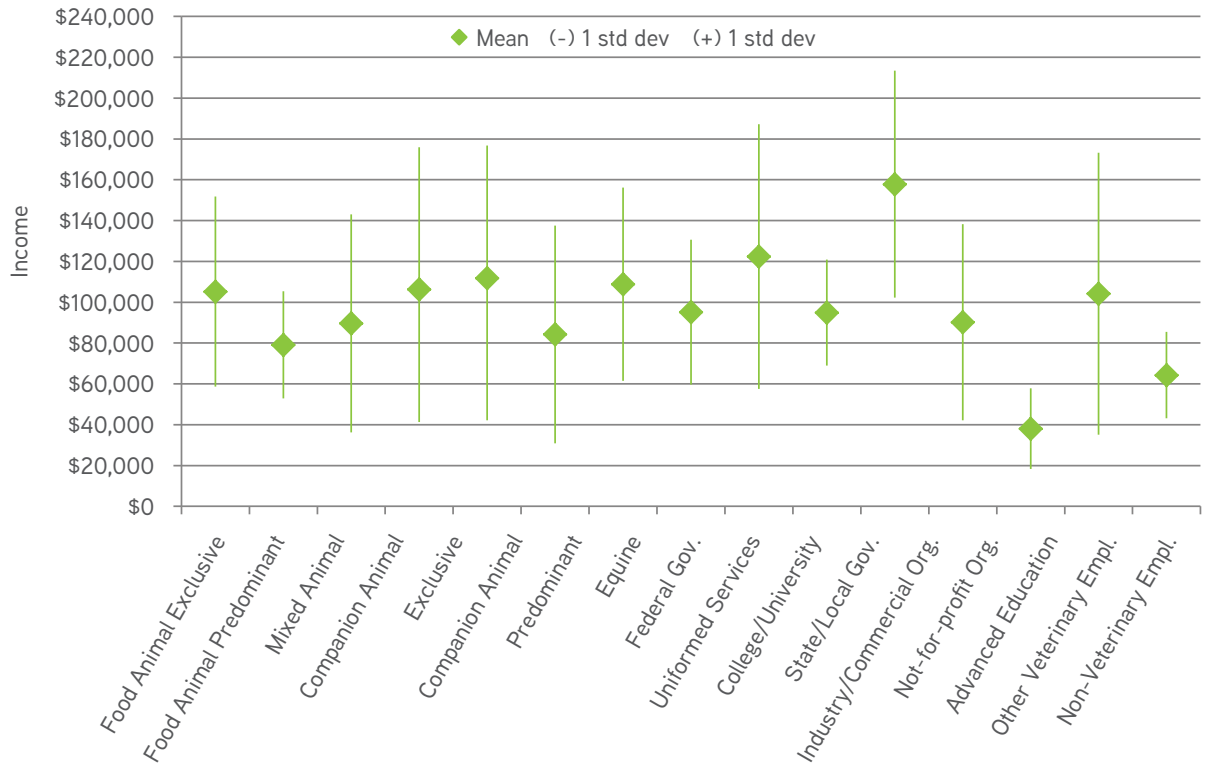



Figure 15

The distribution of incomes by practice type can also be illustrated by describing the mean income at percentiles. Mean income across all practice types for all levels of experience was just over $106,000 in 2016, placing the mean veterinarian income above the 90th percentile of all U.S. workers.

## INCOME PERCENTILES BY PRACTICE TYPE, 2016

| Private Practice | 10% | 25% | Median | 75% | 90% | Mean | Std. Dev. | Obs. |
|---|---|---|---|---|---|---|---|---|
| Food Animal Exclusive* | * | $75,000 | $84,500 | $125,000 | * | $104,429 | $46,575 | 22 |
| Food Animal Predominant* | * | $62,500 | $70,000 | $92,500 | * | $78,325 | $26,213 | 20 |
| Mixed Animal | $50,000 | $61,000 | $75,000 | $95,000 | $190,000 | $88,865 | $53,421 | 99 |
| Companion Animal Predominant | $51,236 | $70,000 | $85,000 | $120,000 | $180,000 | $105,483 | $64,935 | 195 |
| Companion Animal Exclusive | $60,860 | $74,000 | $90,000 | $120,000 | $188,000 | $111,036 | $69,673 | 942 |
| Equine | $40,583 | $50,000 | $65,000 | $92,000 | $190,000 | $83,427 | $53,292 | 74 |
| Total Private Practice | $55,000 | $70,000 | $87,000 | $120,000 | $185,000 | $106,509 | $66,849 | 1,352 |
| | | | | | | | | |
| **Public Practice** | **10%** | **25%** | **Median** | **75%** | **90%** | **Mean** | **Std Dev** | **Obs** |
| Federal Gov. | $59,000 | $73,757 | $107,500 | $134,426 | $175,000 | $108,055 | $47,290 | 52 |
| Uniformed Services* | * | $74,500 | $92,397 | $102,500 | * | $94,400 | $35,510 | 12 |
| College/University | $62,000 | $88,000 | $106,000 | $137,000 | $200,000 | $121,593 | $64,797 | 163 |
| State/Local Gov. | $52,000 | $82,000 | $96,000 | $105,000 | $130,000 | $94,128 | $25,935 | 29 |
| Industry/ Commercial Org. | $89,000 | $115,000 | $150,000 | $200,000 | $228,000 | $157,070 | $55,532 | 67 |
| Not-for-profit Org. | $45,000 | $62,000 | $82,500 | $104,500 | $130,000 | $89,420 | $48,020 | 52 |
| Interns, Residents, & Adv. Educ. | $27,000 | $28,000 | $32,000 | $39,500 | $50,000 | $37,254 | $19,774 | 58 |
| Other Veterinary Empl. | $42,000 | $64,000 | $86,700 | $110,000 | $170,000 | $103,393 | $69,030 | 55 |
| Non-Veterinary Empl.* | * | * | $57,500 | * | * | $63,500 | $21,148 | 3 |
| Total Public Practice | $33,500 | $65,000 | $99,700 | $131,623 | $190,000 | $106,950 | $62,964 | 491 |
| | | | | | | | | |
| **All Employment Types** | $50,000 | $70,000 | $90,000 | $120,000 | $188,000 | $106,627 | $65,820 | 1,843 |

*Note: due to a lack of observations, some table entries have been removed to protect privacy.

Table 6

Using the percentile table to illustrate the effect of experience on income for all practice types indicates that within two decades in the workforce the median income of veterinarians exceeds the median income of the 90th percentile of all U.S. workers. And, as noted earlier, median income begins to drop off after four decades of employment, as veterinarians move towards retirement.

## INCOME PERCENTILES BY EXPERIENCE LEVEL, 2016

| Years of Experience | 10% | 25% | Median | 75% | 90% | Mean | Std. Dev. | Obs. |
|---|---|---|---|---|---|---|---|---|
| 0 | $32,310 | $45,000 | $50,500 | $65,000 | $84,000 | $57,291 | $22,950 | 66 |
| 1-4 | $35,000 | $55,000 | $70,000 | $82,000 | $100,000 | $69,881 | $24,862 | 528 |
| 5-9 | $52,000 | $72,000 | $90,000 | $110,000 | $137,000 | $94,790 | $39,164 | 374 |
| 10-19 | $67,000 | $82,000 | $102,000 | $140,000 | $197,000 | $119,716 | $66,549 | 433 |
| 20-29 | $70,000 | $84,000 | $114,500 | $185,000 | $250,000 | $141,793 | $84,418 | 246 |
| 30-39 | $75,000 | $110,000 | $140,000 | $200,000 | $300,000 | $166,999 | $83,387 | 89 |
| 40+ | $50,000 | $90,000 | $140,000 | $210,437 | $295,000 | $156,471 | $91,956 | 37 |
| All Levels | $50,000 | $70,000 | $90,000 | $120,000 | $188,000 | $106,627 | $65,820 | 1,773 |
| *Note: due to a lack of observations, some table entries have been removed to protect privacy. | | | | | | | | |

Table 7

The impact of additional education on income is illustrated in the table below. Generally there is little impact of additional degrees on income but there is a statistically significant increase in income as a result of obtaining board certification.

## INCOME PERCENTILES BY ADDITIONAL EDUCATION, 2016

| Years of Experience | 10% | 25% | Median | 75% | 90% | Mean | Std. Dev. | Obs. |
|---|---|---|---|---|---|---|---|---|
| DVM only | $51,236 | $75,000 | $102,000 | $150,000 | $220,000 | $125,841 | $83,453 | 181 |
| DVM and Specialized Degree (JD, MD, etc.) | ... | $72,000 | $96,000 | $144,000 | ... | $105,921 | $53,307 | 25 |
| DVM & Bachelor's | $50,000 | $68,000 | $84,000 | $110,000 | $165,000 | $100,461 | $62,515 | 1,263 |
| DVM & Master's | $51,000 | $75,000 | $100,000 | $135,000 | $195,000 | $113,873 | $66,419 | 297 |
| DVM & PhD | $81,000 | $100,000 | $124,000 | $160,000 | $200,000 | $134,868 | $54,827 | 77 |
| | | | | | | | | |
| Board Certification | 10% | 25% | Median | 75% | 90% | Mean | Std. Dev. | Obs. |
| Board Certified | $70,000 | $100,000 | $130,000 | $188,000 | $250,000 | $148,548 | $76,468 | 291 |
| Not Board Certified | $50,000 | $68,000 | $85,000 | $110,000 | $155,000 | $98,771 | $60,519 | 1,551 |
| | | | | | | | | |
| All Levels | $50,000 | $70,000 | $90,000 | $120,000 | $188,000 | $106,627 | $65,820 | 1,843 |
| *Note: Due to a lack of observations, some table entries have been removed to protect privacy. | | | | | | | | |

Table 8

In some of the practice types, such as college and university, there are significant differences in incomes associated with different positions. Positions such as college administrators or deans or higher make significantly more than all other veterinary employees, while administrative positions below the dean make the next highest level.

## SUMMARY STATISTICS FOR VETERINARIANS IN COLLEGE/UNIVERSITY POSITIONS

| | Median | Mean | Std. Dev. | Freq. |
|---|---|---|---|---|
| Professor: (Assistant, Associate, or Full) | $106,000 | $113,305 | $51,767 | 108 |
| Executive: CEO/Vice President/ Chief Administrator/Dean | $230,000 | $243,667 | $116,249 | 6 |
| Manager: Division Director/ Department Chair/Section Head | $160,000 | $164,111 | $72,813 | 21 |
| Clinician | $85,000 | $75,962 | $30,599 | 21 |
| Researcher | $50,000 | $50,667 | $22,304 | 6 |
| Other | $84,000 | $96,026 | $81,220 | 12 |
| **Total** | **$104,000** | **$116,074** | **$66,514** | **174** |

*Some values rounded to protect privacy.

Table 9

## VETERINARY SALARY WORKSHEET

Questions pertaining to veterinarian incomes are one of the most frequent requests received from veterinarians by the AVMAs Veterinary Economics division. The worksheet below was developed using a multiple regression model with available factors found to significantly affect veterinary incomes. The regression model used observations of veterinary incomes from AVMA surveys between 2001 and 2016, including more than 50,000 observations. Thus, the worksheet provides the mean salary for specific demographic characteristics based on historic observations. This worksheet can be used to provide veterinarians with an understanding of how years of experience, practice ownership, location of employment, practice type, gender and education or training beyond the doctor of veterinary medicine degree has affected incomes in the recent past. The worksheet was not intended, however, to be used by either employee or employer in setting or negotiating income. Veterinary incomes should reflect the value of veterinary services provided and the financial performance of the overall operation.

## EXPERIENCED VETERINARIAN SALARY CALCULATOR

| Category | Description | My Input | Male | Female | Product |
|---|---|---|---|---|---|
| Step 1 | For ALL of the following items, enter a value in the "My Input" column: | | | | |
| Basic Information | Constant | 1 | $43,337 | $35,335 | |
| | Last Two Digits of the Current Year | 17 | $2,639 | $1,467 | |
| | Mean Work Hours Per Week | | $330 | $95 | |
| | Practice Owner (1=yes, 0=no) | | $4,806 | $3,079 | |
| Step 2 | For ONE of the following experience categories, enter a "1" in the "My Input" column: | | | | |
| Years of Experience[1] | 1 | | $0 | $16,784 | |
| | 2-3 | | $21,056 | $42,960 | |
| | 4-6 | | $35,324 | $52,113 | |
| | 7-9 | | $48,940 | $60,035 | |
| | 10-14 | | $63,952 | $62,457 | |
| | 15-19 | | $70,793 | $68,860 | |
| | 20-29 | | $81,562 | $75,030 | |
| | 30+ | | $74,554 | $85,673 | |
| Step3 | For ONE of the following U.S. regions, enter a "1" in the "My Input" column: | | | | |
| Employment Region (first digit of ZIP code) | Region 0 (ME, NH, VT, MA, CT, RI, NJ, PR) | | $6,988 | $9,860 | |
| | Region 1 (DE, PA, NY) | | $0 | $6,874 | |
| | Region 2 (DC, MA, NC, SC, VA, WV) | | $0 | $2,751 | |
| | Region 3 (AL, FL, GA, MS, TN) | | $0 | $0 | |
| | Region 4 (IN, KY, MI, OH) | | -$7,336 | -$5,300 | |
| | Region 5 (IA, MN, MT, ND, SD, WI) | | -$8,201 | -$2,713 | |
| | Region 6 (IL, KS, MO, NE) | | $0 | $0 | |
| | Region 7 (AR, LA, OK, TX) | | -$7,367 | $0 | |
| | Region 8 (AZ, CO, ID, NM, UT, WY) | | $7,688 | $4,668 | |
| | Region 9 (AK, CA, HI, NV, OR, WA) | | $0 | -$4,874 | |
| Step 4 | For ONE of the following practice types, enter a "1" in the "My Input" column: | | | | |
| Private Practice | Food Animal (exclusive) | | $0 | -$4,874 | |
| | Food Animal (predominant) | | -$8,831 | -$11,476 | |
| | Mixed Animal | | -$5,668 | -$7,403 | |
| | Companion Animal (exclusive) | | $0 | $0 | |
| | Companion Animal (predominant) | | $0 | -$4,531 | |
| | Equine | | $0 | -$9,287 | |
| Public Practice | Federal Government | | -$8,583 | $3,863 | |
| | Uniformed Services | | -$14,967 | -$7,829 | |
| | College or University | | -$17,617 | -$12,617 | |
| | State or Local Government | | -$29,079 | -$11,543 | |
| | Industry | | $15,537 | $23,900 | |
| | Other Public | | -$13,245 | -$5,626 | |
| Step 5 | For ANY of the following Additional Qualifications, enter a "1" in the "My Input" column: | | | | |
| Additional Qualifications | Master's Degree (MS, MBA, MA, etc) | | $0 | $3,078 | |
| | Doctorate Degree (besides DVM) | | $7,899 | $7,831 | |
| | Residency Completed | | $3,833 | $3,702 | |
| | Board Certified | | $13,132 | $14,983 | |
| | | | | | |
| Step 6 | For EVERY entry in the "My Input" column, multiply by the number in either the "Male" or "Female" column and enter the result in the "Product" column. | | | | |
| Step 7 | Add ALL of the entries in the "Product" column. This is the mean salary for your situation: | | | | |

[1]For "Years of Experience," take the current year and subtract your year of graduation from veterinary college, as well as any time spent out of the workforce or as a full-time student.

Table 10

## EARLY CAREER SALARIES OF BOARD-CERTIFIED VETERINARIANS

Among the many factors that may motivate veterinarians to become board certified is increased compensation. This type of specialization leads not only to an increase in the breadth of one's skillset, but also a refinement; focusing on one area of a skillset makes a veterinarian faster and more efficient, which leads to higher compensation.

In the experienced veterinary salary calculator, it was shown that while accounting for all other factors, a higher mean income is obtained by both board certification ($13,132 for men and $14,983 for women) and having served in a residency ($3,833 for men and $3,702 for women). That is important to know, but a real question faced by veterinarians – particularly those who may have only worked in advanced education positions, such as internships and residencies – is how to determine just how much they should seek for a post-board certification starting salary. The answer is not straightforward because the interpretation of the survey questions appears to be inconsistent across survey respondents. To counter this inconsistency, the table below provides income summary statistics for a small variety of experience levels.

Through other analyses, when all factors are simultaneously taken into consideration, including hours worked, region of the United States, other advanced degrees, practice type, practice ownership, and years of experience, we find that a residency adds between $2,527-$3,732 of income per year and board certification adds an additional amount between $14,599-$16,388 per year, or just short of $20,000 together. This information could influence the career decision of someone thinking of seeking board certification. Once that decision has been made, however, and a new board-certified veterinarian enters the workforce, he or she needs information to negotiate a starting salary and knowing the $20,000 premium for all board-certified veterinarians won't help them. They can't simply ask for a $20,000 premium, because they have been board certified.

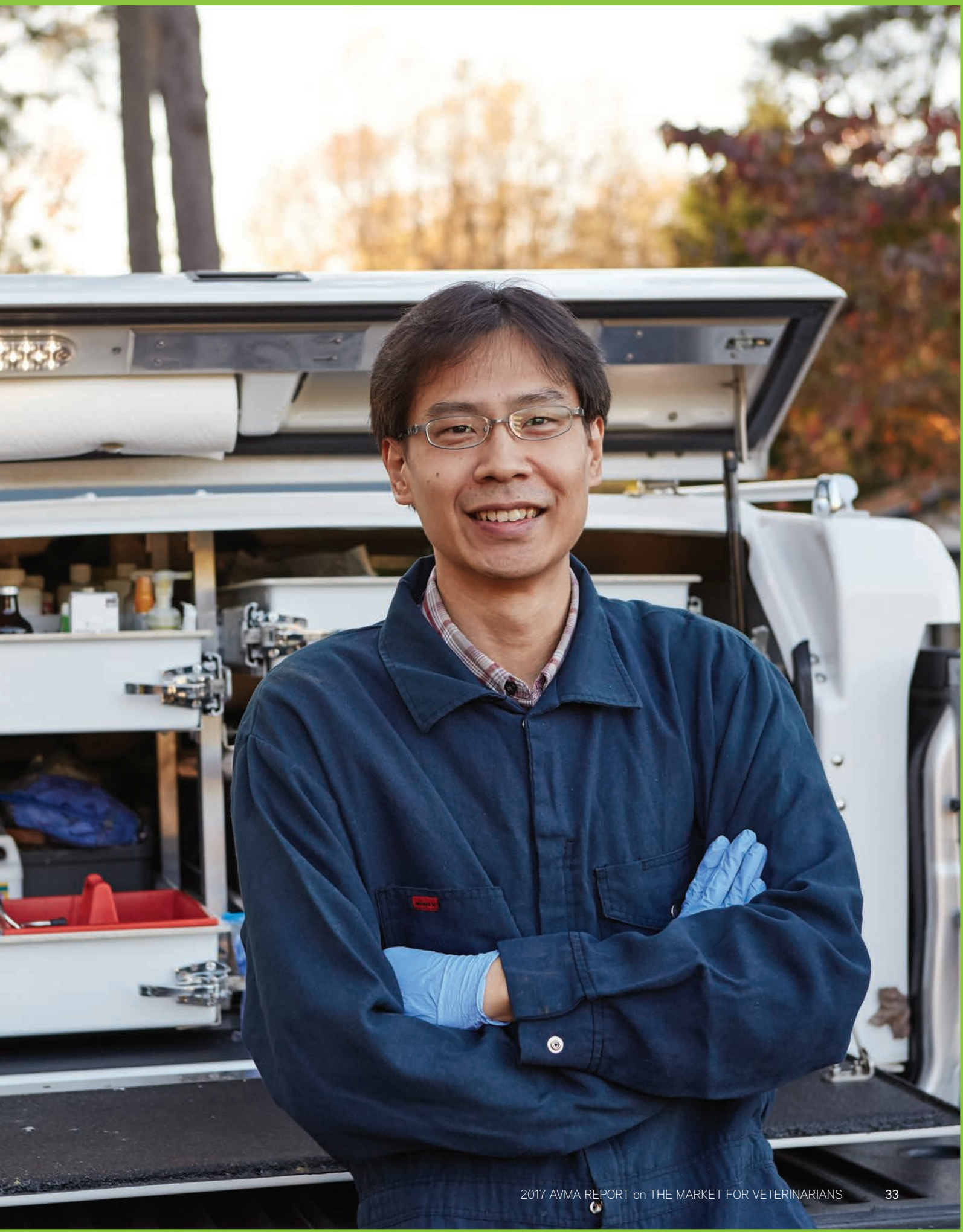
The data used to create the following table are from the 2016 AVMA Census of Veterinarians. While a survey respondent's starting salary after the subject has become board certified isn't specifically asked, an educated guess can be made based on the number of years since the reported (DVM) graduation. The table below gives the summary statistics for those in the survey who are five, six and seven years post-graduate with their DVM degree, who are board certified, and whose income listed is for the prior year, 2015. For example, someone who graduated five years ago would be from the DVM class of 2010 reporting income for the 2015 year. For a traditional student, this would correspond to graduating in 2010, interning in 2011, serving in a residency from 2011-2014, and earning a full-time income from 2014-2015. This calculation gets complicated, however, because not everyone is a traditional student: Some will take a longer or shorter time to go through internships and residencies; some might take time off between DVM graduation and an internship/residency; some might study longer for exams; and some might face a variety of other complicating circumstances. There are few data points meeting these criteria, so it is not possible to look at each board-certified specialty.

### EARLY CAREER SALARIES OF BOARD CERTIFIED VETERINARIANS, 2016

| DVM Graduation Year | Observations | Median | Mean | Std. Dev. |
|---|---|---|---|---|
| 2010 | 50 | $103,200 | $103,454 | $57,741 |
| 2009 | 9 | $124,000 | $125,778 | $42,384 |
| 2008 | 8 | $120,000 | $130,500 | $44,117 |
| 2010*** | 40 | $116,000 | $121,228 | $49,800 |
| **** Excludes observations below $60,000, which are presumably residents' salaries. | | | | |

Table 11

Both the mean and median salaries for those indicating they are board certified are well above the mean and median salaries of those not board certified with an equivalent level of education, and represent a large increase, approaching $50,000 over the starting salaries of those veterinarians who are recent graduates.



# VETERINARIAN EMPLOYMENT

## THE SURVEY INSTRUMENTS

In 2014 and 2015, two AVMA surveys collected data on employment and income of U.S. veterinarians. The first survey, the Employment Survey, was initiated in 2014 with the purpose of quantifying unemployment and underemployment. The sample frame for the Employment Survey was drawn from the AVMA database of veterinarians that includes all graduates from U.S. veterinary schools; U.S. graduates from AVMA-accredited foreign colleges; and any other veterinarians who have sought AVMA membership at any time in the past. The sample frame included AVMA members and non-members who graduated one, five, 10, 15 (only in the 2015 survey) and 25 years prior.

The second survey, the Veterinary Compensation Survey, formerly known as the Biennial Economic Survey, is conducted to gauge compensation trends among the veterinary profession. The sample frame is randomly drawn from all veterinarians for whom the AVMA has contact information.

In 2016 the employment survey and the compensation survey were combined to reduce the number of national surveys and provide a more comprehensive set of information for each respondent. The new survey, referred to as the census of veterinarians is fielded in January and February and questions cover events that occurred in or over the previous year.

## AVMA SURVEYS RESPONSE RATES

| | 2014 | 2015 | 2016 |
|---|---|---|---|
| Employment Survey | 22.7% | 19.0% | |
| Compensation Survey | 14.7% | 11.8% | |
| Census of Veterinarians | | | 11.8% |

Table 12

### SAMPLE RESPONDENTS AND AVMA DATABASE BY PRACTICE TYPE

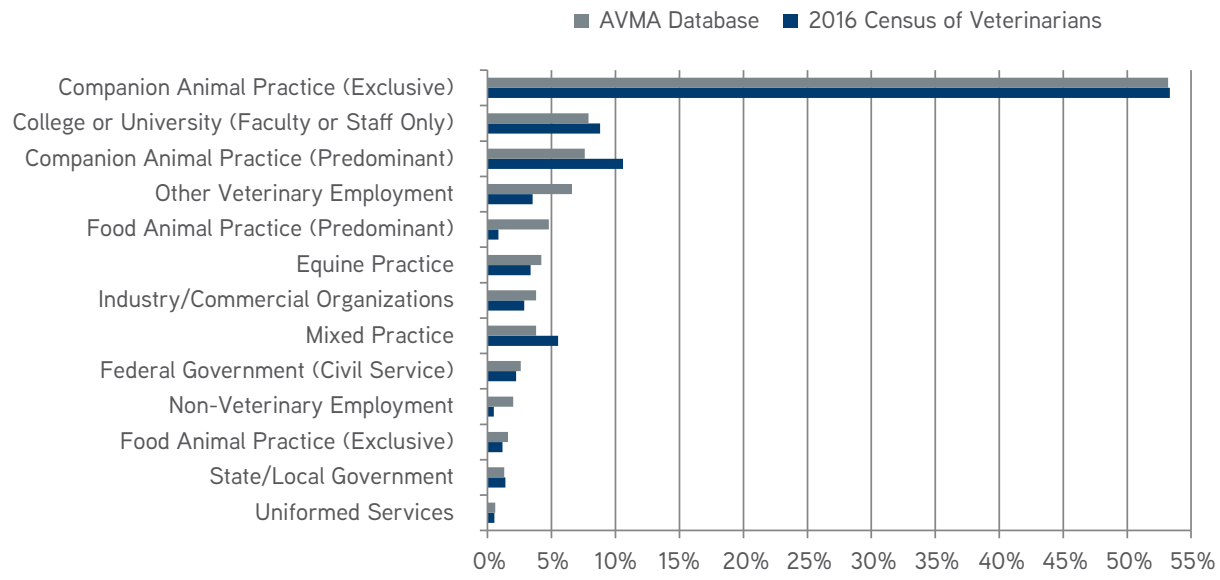



Figure 16

The respondents to both surveys represented the distribution of veterinarians across the profession by practice type and region, generally, but there were not sufficient responses to provide detailed information for each practice type in each region.

### SAMPLE RESPONDENTS, AVMA DATABASE AND U.S. POPULATION BY REGION

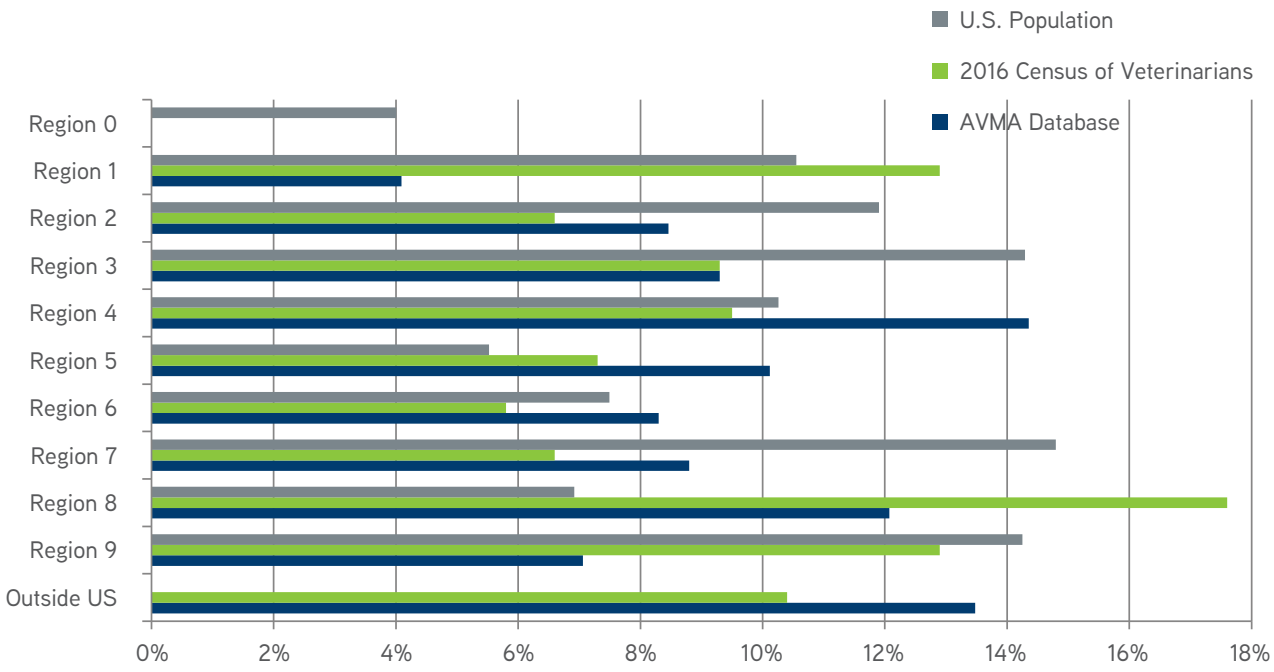



Figure 17

[2] Region is identified by the first digit of the zip code. A map of the regions can be found on page 13 of the 2016 AVMA Report on the Veterinary Markets.

The distribution of gender varies by survey and, again, generally represents a larger share of females in the profession compared to males.

Because of the differences in distribution by practice type, region and gender, and between surveys, descriptive statistics for each survey must be weighted to reflect the change in the distribution of veterinarians across these factors to provide an accurate measure for each variable over time. A higher percentage of females than males responded to the survey compared to the gender distribution found in the profession.

**SAMPLE RESPONDENTS AND AVMA DATABASE BY GENDER**

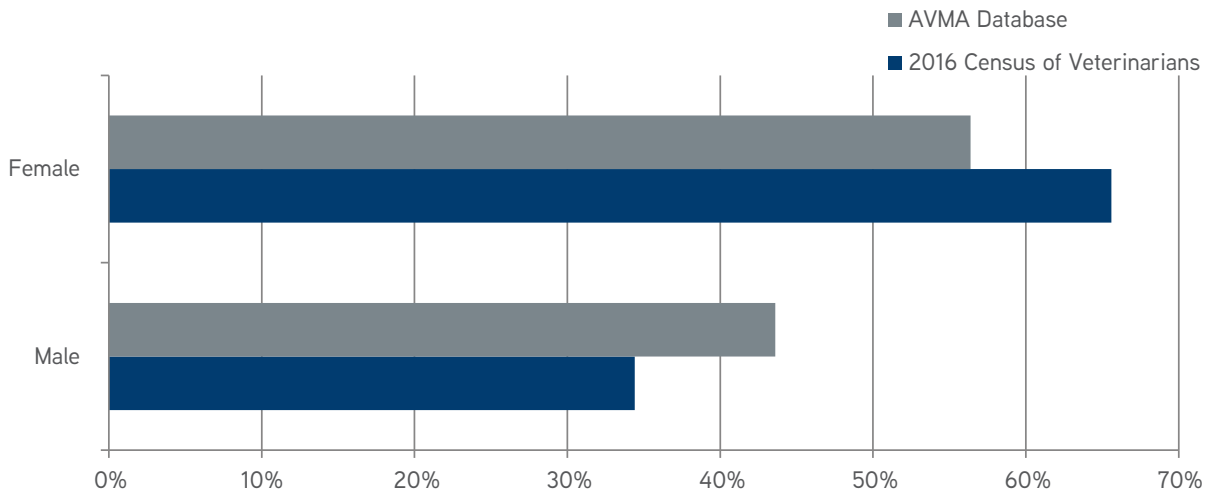



Figure 18

The higher percentage of female respondents corresponds to the higher number of early career veterinarians who responded, as the majority of these early career veterinarians are female.

**2016 CENSUS OF VETERINARIANS, AVMA DATABASE**

| | 2016 Census of Veterinarians | AVMA Database | | |
|---|---|---|---|---|
| | N | Percent | N | Percent |
| 2006-2015 | 1,313 | 42.7% | 35,657 | 27.8% |
| 1996-2005 | 738 | 24.0% | 27,728 | 21.6% |
| 1986-1995 | 488 | 15.9% | 24,711 | 19.3% |
| 1976-1985 | 288 | 9.4% | 20,830 | 16.2% |
| 1966-1975 | 171 | 5.6% | 11,797 | 9.2% |
| 1956-1965 | 71 | 2.3% | 5,849 | 4.6% |
| 1946-1955 | 9 | 0.3% | 1,782 | 1.4% |
| Missing | 56 | | | |
| **Total** | **3,134** | | | |

Table 13

There was, however, very little difference in the distribution of respondents by veterinary college attended, compared to the veterinary population, except that graduates of Texas A&M responded at twice the rate as graduates of any other U.S. veterinary college and graduates of veterinary colleges outside of the United States and the Caribbean.

**SAMPLE RESPONDENTS AND AVMA DATABASE BY VETERINARY COLLEGE ATTENDED**

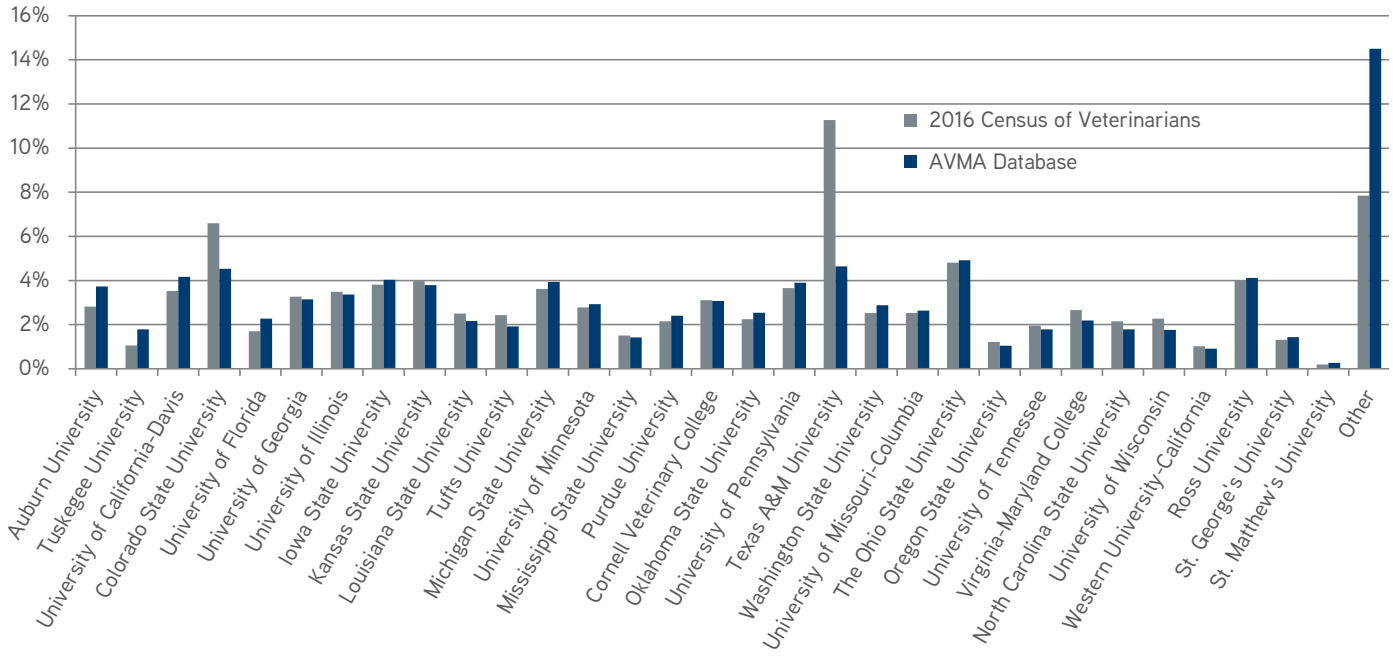



Figure 19

## UNEMPLOYMENT

Since 2014, the AVMA has been estimating the unemployment rate. As noted earlier, each survey is conducted at the beginning of the year and reports the unemployment rate for the previous year. Thus, the 2016 Survey provides the unemployment rate for 2015, and the same is true for the underemployment rate and veterinary education outcomes assessments for the veterinary profession.

### Summary Statistics

The 2014 Employment Survey indicated that the 2013 unweighted unemployment rate was 3.3 percent, with 1.7 percent of respondents not responding to the question. The 2015 Employment Survey indicated that the 2014 unweighted unemployment rate was 4.4 percent, with 1.2 percent of respondents not responding to the question. The confidence interval around the 2014 and 2015 surveys was .81 percent and .85 percent, respectively, and thus the two rates are not statistically different. In 2016, the census survey was used to indicate the 2015 unweighted unemployment rate of 4.5 percent, with 0.4 percent of the respondents not responding to this specific question.

To better align with the BLS estimates of unemployment a set of new questions was asked in 2016 to determine how many of those unemployed were actively seeking employment (the BLS definition). Eliminating respondents who indicated they were unemployed in 2015 because they were not actively seeking employment and those who were seeking enrollment in an internship, residency or advanced education yielded an unemployment rate of 1.7 percent, which is well below the 4.6 percent national unemployment rate reported for 2015.

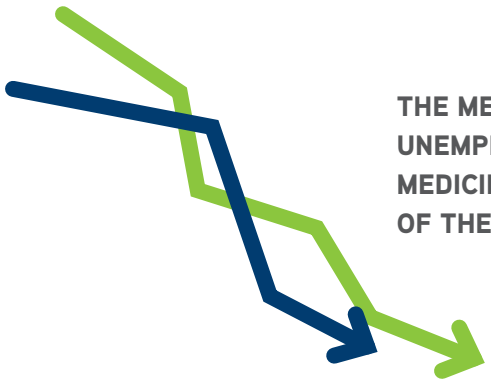
### UNEMPLOYMENT RATE: 2016 SURVEY

| Are you currently employed in veterinary medicine? | 2014 Survey | 2015 Survey | 2016 Survey |
|---|---|---|---|
| Yes | 95.0% | 94.4% | 89.0% |
| No | 3.3% | 4.4% | 4.5% |
| Retired | | | 6.1% |
| Missing | 1.7% | 1.2% | 0.4% |

| If unemployed, are you seeking employment in veterinary medicine? | 2014 Survey | 2015 Survey | 2016 Survey |
|---|---|---|---|
| Seeking employment in veterinary medicine | | | 38.8% |
| Seeking enrollment in an internship, residency, or advanced education program | | | 12.9% |
| Not seeking employment (and not retired) | | | 48.2% |

| | | | |
|---|---|---|---|
| Unemployment Rate | | | 1.7% |

Table 14



**THE MEAN NUMBER OF WEEKS UNEMPLOYED IN VETERINARY MEDICINE HAS DECLINED EACH OF THE LAST THREE YEARS...**

The surveys also sought the length and duration of unemployment in the veterinary profession by each of the respondents. The mean number of weeks unemployed in veterinary medicine has declined each of the last three years while the number of isolated periods of unemployment has not shown any significant change and remains near two periods.

### LENGTH AND DURATION OF UNEMPLOYMENT

| | | Mean | N | Std. Dev. | Minimum | Maximum |
|---|---|---|---|---|---|---|
| 2014 Survey | How many weeks have you been unemployed in veterinary medicine? | 55.7 | 60 | 49.7 | 1 | 156 |
| | How many isolated periods of unemployment have you had? | 1.7 | 57 | 1.3 | 1 | 10 |
| 2015 Survey | How many weeks have you been unemployed in veterinary medicine? | 47.9 | 65 | 48.5 | 0 | 156 |
| | How many isolated periods of unemployment have you had? | 2.1 | 63 | 1.7 | 1 | 10 |
| 2016 Survey | How many weeks have you been unemployed in veterinary medicine? | 36.5 | 93 | 20.3 | 0 | 52 |
| | How many isolated periods of unemployment have you had? | 1.6 | 66 | 1.1 | 0 | 5 |

Table 15

Unemployment by gender and year of graduation over the last three years has generally shown higher unemployment rates for females compared to males, and unemployment rates across all graduation years and gender have generally remained lower than the national average unemployment rate.

### UNEMPLOYMENT BY GENDER AND YEAR OF GRADUATION

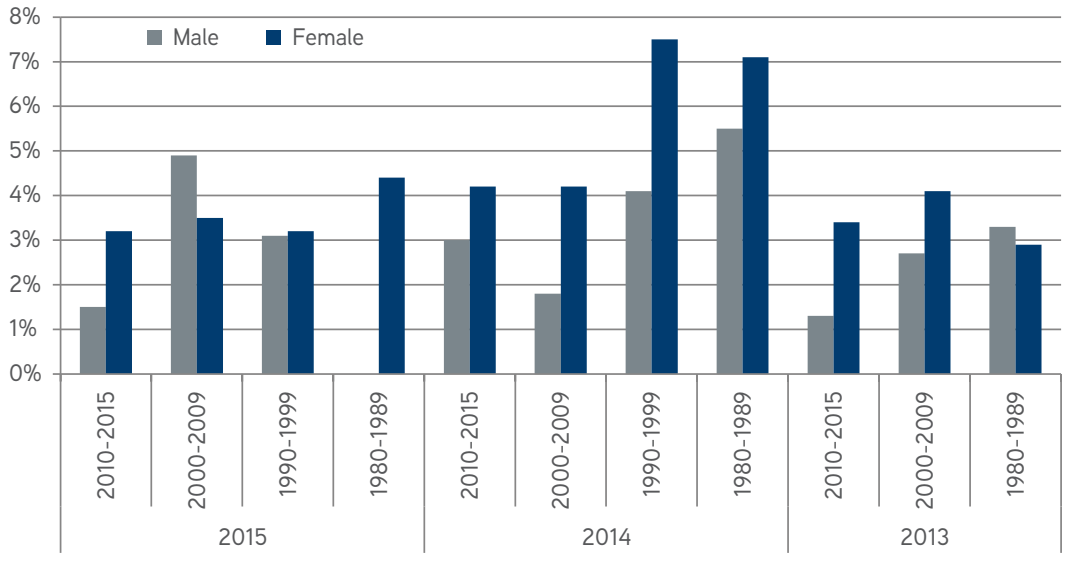


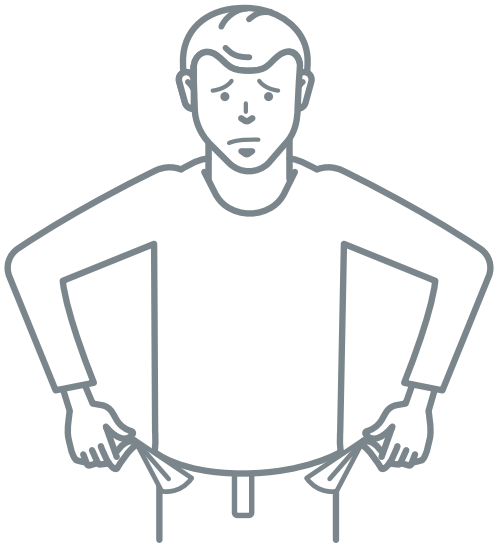

Figure 20

Unemployment also varied by region with the Northeast region (Region 0) having the highest unemployment rate (4.8 percent) and the south central region (Region 7), which comprises Arkansas, Louisiana, Oklahoma and Texas, having the lowest unemployment rate (0.9 percent). Texas is one of the states that must import veterinarians, as the supply from Texas A&M is insufficient to meet the state's demand for veterinarians. This demand has been found to pull a large number of veterinarians from adjacent states and thus creates a relatively low supply/demand ratio for the region as a whole.

**REGION AND EMPLOYMENT STATUS, 2016**

| | Working full time in veterinary medicine | Working part time in veterinary medicine | Unemployed in veterinary medicine | Retired from veterinary medicine | Total |
|---|---|---|---|---|---|
| Region 0 | 83.2% | 10.7% | 3.6% | 2.6% | 100.0% |
| Region 1 | 77.7% | 12.6% | 3.9% | 5.8% | 100.0% |
| Region 2 | 77.2% | 14.2% | 2.1% | 6.6% | 100.0% |
| Region 3 | 78.0% | 11.8% | 2.7% | 7.4% | 100.0% |
| Region 4 | 81.5% | 9.7% | 3.1% | 5.7% | 100.0% |
| Region 5 | 72.6% | 15.1% | 3.9% | 8.4% | 100.0% |
| Region 6 | 78.2% | 13.6% | 2.9% | 5.3% | 100.0% |
| Region 7 | 79.1% | 14.5% | 1.1% | 5.3% | 100.0% |
| Region 8 | 78.3% | 14.1% | 1.8% | 5.8% | 100.0% |
| Region 9 | 78.1% | 14.1% | 2.5% | 5.3% | 100.0% |
| Outside U.S. | 67.6% | 5.4% | 18.9% | 8.1% | 100.0% |
| **Total** | **78.6%** | **13.0%** | **2.7%** | **5.6%** | **100.0%** |

Table 16



**UNEMPLOYMENT IS ALSO AFFECTED BY THE CHOICE OF FIRSTEMPLOYMENT, WITH THOSE FIRST EMPLOYED IN ADVANCED EDUCATION, OTHER VETERINARY EMPLOYMENT, AND STATE AND LOCAL GOVERNMENT HAVING THE HIGHEST UNEMPLOYMENT.**

Unemployment is also affected by the choice of first employment, with those first employed in advanced education, other veterinary employment, and state and local government having the highest unemployment.

### FIRST VETERINARY EMPLOYMENT AND CURRENT EMPLOYMENT STATUS

| | Working Full Time In Veterinary Medicine | Working Part Time In Veterinary Medicine | Unemployed In Veterinary Medicine | Retired From Veterinary Medicine | Total |
|---|---|---|---|---|---|
| Food Animal Practice (Exclusive) | 81.8% | 11.4% | 6.8% | | 100.0% |
| Food Animal Practice (Predominant) | 67.3% | 13.3% | 1.0% | 18.4% | 100.0% |
| Mixed Practice | 75.5% | 13.4% | 3.4% | 7.7% | 100.0% |
| Companion Animal Practice (Predominant) | 77.1% | 13.1% | 3.7% | 6.1% | 100.0% |
| Companion Animal Practice (Exclusive) | 79.1% | 16.0% | 1.7% | 3.2% | 100.0% |
| Equine Practice | 87.9% | 4.7% | 2.0% | 5.4% | 100.0% |
| Federal Government (Civil Service) | 66.7% | 3.7% | 11.1% | 18.5% | 100.0% |
| Uniformed Services | 52.1% | 14.1% | | 33.8% | 100.0% |
| College or University (Faculty or Staff Only) | 83.9% | 6.0% | 3.4% | 6.7% | 100.0% |
| State/Local Government | 81.3% | | 6.3% | 12.5% | 100.0% |
| Industry/ Commercial Organization | 84.8% | 3.0% | 12.1% | | 100.0% |
| Not-For-Profit Organization | 89.5% | 5.3% | | 5.3% | 100.0% |
| Currently Participating in Internship/ Residency | 97.6% | | 2.4% | | 100.0% |
| Currently Pursuing Advanced Education | 27.3% | 18.2% | 54.5% | | 100.0% |
| Other | 67.1% | 9.6% | 15.1% | 8.2% | 100.0% |
| **Total** | **78.1%** | **13.1%** | **3.0%** | **5.8%** | **100.0%** |

Table 17

Unemployment also varied by veterinary college attended, with those who attended St. George's University and other (schools, not mentioned, outside of the 28 U.S.-accredited colleges of veterinary medicine) having the highest unemployment rates.

**UNEMPLOYMENT BY VETERINARY COLLEGE**

| | 2016 | 2015 |
|---|---|---|
| St. George's University | 7.5% | 5.1% |
| Cornell Veterinary College | 6.2% | 1.3% |
| University of Minnesota | 5.7% | 1.4% |
| University of Wisconsin | 4.2% | 3.0% |
| The Ohio State University | 4.0% | 2.4% |
| Tufts University | 3.9% | 0.0% |
| University of Missouri-Columbia | 3.8% | 2.9% |
| Michigan State University | 3.5% | 2.2% |
| Iowa State University | 3.4% | 2.4% |
| Western University - California | 3.1% | 0.0% |
| North Carolina State University | 3.0% | 1.6% |
| University of California-Davis | 2.8% | 1.2% |
| Louisiana State University | 2.6% | 0.0% |
| Virginia-Maryland College | 2.4% | 0.0% |
| Auburn University | 2.3% | 0.0% |
| University of Florida | 1.9% | 0.0% |
| Kansas State University | 1.6% | 1.1% |
| University of Tennessee | 1.6% | 0.0% |
| Purdue University | 1.5% | 0.0% |
| Colorado State University | 1.0% | 0.0% |
| University of Georgia | 1.0% | 0.0% |
| University of Illinois | 0.9% | 0.0% |
| University of Pennsylvania | 0.9% | 0.0% |
| Texas A&M University | 0.6% | 0.0% |
| Mississippi State University | 0.0% | 0.0% |
| Oklahoma State University | 0.0% | 0.0% |
| Oregon State University | 0.0% | 0.0% |
| Ross University | 0.0% | 0.0% |
| St. Matthew's University | 0.0% | 0.0% |
| Tuskegee University | 0.0% | 0.0% |
| Washington State University | 0.0% | 0.0% |
| Other | 13.1% | 7.3% |
| **Total** | **3.0%** | **1.4%** |

Table 18

## Factors affecting Unemployment

To identify the relationship between unemployment and the various factors presented above, a logistic regression was employed. The logistic regression predicts the probability that an observation falls into one of two categories, in this case employed or unemployed. Unemployment regression identifies the respondents as having a higher likelihood of being unemployed in veterinary medicine if the coefficient (B) is positive and significant. The increase in probability of being unemployed is defined by the Exp(B). For instance, having a first employment in companion animal exclusive medicine indicates a 11.6 times higher probability associated with unemployment. The factors that are significant are associated with unemployment, not necessarily a cause of unemployment. However, this regression applies to all respondents who were unemployed in veterinary medicine. This does not mean they are all seeking employment in veterinary medicine nor does it mean they are unemployed. It just means they are not currently employed in veterinary medicine.

Factors found to be associated with a higher probability of unemployment were first employment in companion animal (exclusive or predominant), equine, food animal or mixed animal practice, non-board certified, poor health, intern or resident, female, or reside in the northeast (Region 0).

**FACTORS AFFECTING UNEMPLOYMENT IN VETERINARY MEDICINE**

| | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| First Veterinary Employment: Companion Animal Exclusive | 2.455 | .511 | 23.103 | 1 | .000 | 11.641 |
| Board Certified =1 else 0 | 2.362 | .680 | 12.067 | 1 | .001 | 10.615 |
| Health, Poor=1, Excellent=5 | .422 | .144 | 8.579 | 1 | .003 | 1.524 |
| First Veterinary Employment: Companion Animal Predominant | 1.489 | .582 | 6.535 | 1 | .011 | 4.431 |
| First Veterinary Employment: Mixed Practice | 1.305 | .532 | 6.018 | 1 | .014 | 3.688 |
| First Veterinary Employment: Intern/ Resident | 2.058 | .883 | 5.429 | 1 | .020 | 7.833 |
| Gender: Male=1, Female=2 | -.773 | .348 | 4.931 | 1 | .026 | .462 |
| First Veterinary Employment: Equine | 1.678 | .770 | 4.748 | 1 | .029 | 5.353 |
| First Veterinary Employment: Food Animal Predominant | 2.468 | 1.146 | 4.632 | 1 | .031 | 11.793 |
| Live Region 0 | 1.362 | .692 | 3.875 | 1 | .049 | 3.902 |
| First Veterinary Employment: Advanced Education | -2.172 | 1.144 | 3.601 | 1 | .058 | .114 |
| Live Region 2 | 1.455 | .787 | 3.415 | 1 | .065 | 4.284 |
| Live Region 7 | 1.406 | .778 | 3.265 | 1 | .071 | 4.080 |
| Live Region 1 | 1.232 | .706 | 3.047 | 1 | .081 | 3.429 |
| Live Region 9 | 1.194 | .694 | 2.955 | 1 | .086 | 3.299 |
| Live Region 5 | 1.352 | .819 | 2.728 | 1 | .099 | 3.865 |
| Own | 1.042 | .659 | 2.500 | 1 | .114 | 2.836 |
| Live Region 4 | 1.194 | .757 | 2.484 | 1 | .115 | 3.300 |
| Other Master's Degree | -1.102 | .733 | 2.264 | 1 | .132 | .332 |
| Married | .464 | .314 | 2.189 | 1 | .139 | 1.591 |
| Live Region 3 | .916 | .699 | 1.715 | 1 | .190 | 2.499 |
| Live Region 8 | .961 | .735 | 1.709 | 1 | .191 | 2.614 |
| DVM Debt | .000 | .000 | 1.650 | 1 | .199 | 1.000 |
| Divorced | .872 | .697 | 1.567 | 1 | .211 | 2.393 |

| | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| First Veterinary Employment: Food Animal Exclusive | 1.147 | .930 | 1.520 | 1 | .218 | 3.148 |
| Live Region 6 | 1.008 | .833 | 1.462 | 1 | .227 | 2.740 |
| Ph.D, Ed.D. | -.455 | .570 | .636 | 1 | .425 | .634 |
| M.P.H. | -.566 | .713 | .631 | 1 | .427 | .568 |
| Widowed | -.851 | 1.131 | .567 | 1 | .452 | .427 |
| Other Degree | -.519 | .710 | .535 | 1 | .465 | .595 |
| First Veterinary Employment: Industry | -.616 | .866 | .505 | 1 | .477 | .540 |
| Number of years post Graduation (2015=1) | -.011 | .015 | .492 | 1 | .483 | .989 |
| Rent | .446 | .642 | .482 | 1 | .488 | 1.562 |
| First Veterinary Employment: College/ University | .484 | .707 | .470 | 1 | .493 | 1.623 |
| M.S. | -.157 | .448 | .124 | 1 | .725 | .854 |
| First Veterinary Employment: State/ Local Government | .415 | 1.197 | .120 | 1 | .729 | 1.514 |
| No Additional Degree | .182 | .593 | .094 | 1 | .759 | 1.199 |
| Bachelor's Degree | .137 | .459 | .089 | 1 | .765 | 1.147 |
| First Veterinary Employment: Federal Government | -.254 | .970 | .068 | 1 | .794 | .776 |
| Separated | .320 | 1.377 | .054 | 1 | .816 | 1.377 |
| M.A. | .060 | .920 | .004 | 1 | .948 | 1.062 |
| First Veterinary Employment: Uniformed Services | 18.789 | 5352.097 | .000 | 1 | .997 | 144568987 |
| First Veterinary Employment: Not-for-Profit | 19.417 | 6196.786 | .000 | 1 | .997 | 270790377 |
| M.B.A. | 16.929 | 5737.402 | .000 | 1 | .998 | 22505590 |
| Specialized Professional Degree | 17.195 | 11536.951 | .000 | 1 | .999 | 29343215 |
| St George's University | -18.494 | 14178.460 | .000 | 1 | .999 | .000 |
| University of Minnesota | -18.396 | 14178.460 | .000 | 1 | .999 | .000 |
| Other University | -18.045 | 14178.460 | .000 | 1 | .999 | .000 |
| Louisiana State University | -17.973 | 14178.460 | .000 | 1 | .999 | .000 |
| The Ohio State University | -17.904 | 14178.460 | .000 | 1 | .999 | .000 |
| Iowa State University | -17.738 | 14178.460 | .000 | 1 | .999 | .000 |
| University of Missouri - Columbia | -17.713 | 14178.460 | .000 | 1 | .999 | .000 |

| | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| Tufts University | -17.619 | 14178.460 | .000 | 1 | .999 | .000 |
| Cornell University | -17.567 | 14178.460 | .000 | 1 | .999 | .000 |
| North Carolina State University | -17.530 | 14178.460 | .000 | 1 | .999 | .000 |
| University of Wisconsin | -17.467 | 14178.460 | .000 | 1 | .999 | .000 |
| Western University | -17.329 | 14178.460 | .000 | 1 | .999 | .000 |
| Virginia Maryland College | -17.303 | 14178.460 | .000 | 1 | .999 | .000 |
| University of California - Davis | -17.192 | 14178.460 | .000 | 1 | .999 | .000 |
| University of Florida | -17.121 | 14178.460 | .000 | 1 | .999 | .000 |
| Purdue University | -16.990 | 14178.460 | .000 | 1 | .999 | .000 |
| University of Tennessee | -16.921 | 14178.460 | .000 | 1 | .999 | .000 |
| Michigan State University | -16.832 | 14178.460 | .000 | 1 | .999 | .000 |
| Kansas State University | -16.710 | 14178.460 | .000 | 1 | .999 | .000 |
| University of Illinois | -16.484 | 14178.460 | .000 | 1 | .999 | .000 |
| Auburn University | -16.464 | 14178.460 | .000 | 1 | .999 | .000 |
| University of Georgia | -16.418 | 14178.460 | .000 | 1 | .999 | .000 |
| Texas A&M University | -16.111 | 14178.460 | .000 | 1 | .999 | .000 |
| Colorado State University | -16.021 | 14178.460 | .000 | 1 | .999 | .000 |
| Washington State University | .649 | 14903.462 | .000 | 1 | 1.000 | 1.914 |
| Tuskegee University | .530 | 15732.386 | .000 | 1 | 1.000 | 1.699 |
| Mississippi State University | .265 | 15311.080 | .000 | 1 | 1.000 | 1.304 |
| Oregon State University | .249 | 15423.322 | .000 | 1 | 1.000 | 1.283 |
| University of Pennsylvania | -.100 | 14680.329 | .000 | 1 | 1.000 | .905 |
| Oklahoma State University | .009 | 15030.787 | .000 | 1 | 1.000 | 1.009 |
| Ross University | -.008 | 14645.102 | .000 | 1 | 1.000 | .992 |
| Constant | 16.266 | 14178.460 | .000 | 1 | .999 | 11595008 |

| Observed | | Predicted | | |
|---|---|---|---|---|
| | | Employment Status | | Percentage Correct |
| | | Unemployed | Employed | |
| Employment Status | Unemployed | 7 | 72 | 8.9 |
| | Employed | 5 | 2,613 | 99.8 |
| Overall Percentage | | | | 97.1 |

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|---|---|---|---|
| 1 | 515.401a | .071 | .305 |

Table 19

Only 1.5 percent of the sample is unemployed in veterinary medicine and seeking employment or other continuing education in veterinary medicine. That is, there is a subset of respondents that is unemployed in veterinary medicine but employed outside of veterinary medicine, and not seeking employment in veterinary medicine.

**UNEMPLOYED SEEKING EMPLOYMENT OR CONTINUING EDUCATION IN VETERINARY MEDICINE**

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Seeking employment in veterinary medicine | 34 | 1.1 | 27 | 27 |
| Seeking enrollment in an internship, residency, or other academic program | 12 | 0.4 | 9.5 | 36.5 |
| Not seeking employment or enrollment | 80 | 2.6 | 63.5 | 100 |
| Total | 126 | 4 | 100 | |
| System | 3,008 | 96 | | |
| **Total** | **3,134** | **100** | | |

Table 20

When only those currently unemployed and seeking employment in veterinary medicine are considered, the only significant variable associated with a higher probability of being unemployed was graduation date. That is, recent graduates have a statistically higher probability of being unemployed and seeking employment in veterinary medicine.

**SEEKING EMPLOYMENT AND GRADUATION YEAR**

| Graduation Years | Seeking Employment in Veterinary Medicine | Not Seeking Employment in Veterinary Medicine | Total |
|---|---|---|---|
| 2006-2015 | 27 | 17 | 44 |
| 1996-2005 | 12 | 16 | 28 |
| 1986-1995 | 7 | 16 | 23 |
| 1976-1985 | 0 | 11 | 11 |
| 1966-1975 | 0 | 11 | 11 |
| 1956-1965 | 0 | 7 | 7 |
| 1946-1955 | 0 | 2 | 2 |
| **Total** | **46** | **80** | **126** |

Table 21

## UNDEREMPLOYMENT

As noted earlier, the unemployment rate considers only those who are unemployed and seeking employment. Within veterinary medicine the unemployment rate for veterinarians would consider only those who are not employed but desire to be employed (are actively seeking employment) in the veterinary profession. But the unemployment rate doesn't measure the true number of people who are looking for work, because it does not count those who are underemployed. Because the unemployment rate is computed using the same method each year, it is an indicator of employment conditions. The point of an indicator is to measure the exact same thing consistently over time, not necessarily to put an exact measurement on a broad concept with multiple interpretations. Generally, these indicators are not meant to give accurate point estimates, but to provide an indication as to whether conditions are improving or worsening.

The AVMA Census of Veterinarians Survey was designed to measure both unemployment and underemployment. Underemployment occurs because a worker is not working as many hours as he or she would like, or the worker is not working in a position that utilizes his or her training and experience.

Underemployment has two definitions. In the context of the veterinary field, the first definition of underemployment is when a veterinarian may be keeping busy all the time but would be able to see more clients and perform more productive work with additional veterinary technicians or physical space. The second definition of underemployment, as measured in total hours, represents the number of hours that veterinarians desire to work above what they are currently working. This was measured as the desire to increase/decrease hours worked for an equivalent increase/decrease in compensation. The most important aspect of the question pertaining to hours worked was the associated increase or decrease in compensation. The survey question asked if veterinarians wish to work more for greater compensation or work less for less compensation. Additional questions sought the actual number of hours per week currently and the number of hours that would be preferred.

### Summary Statistics

Underemployment was again negative in 2016 following the trend started in 2014, with more veterinarians indicating they wish to work fewer hours for less compensation than those who wish to work more hours for more compensation. In 2016, veterinarians wanted to reduce a net total 135,640 weekly hours of work, and this would require an additional 3,391 veterinary FTEs (40 hours per week equals one FTE) to eliminate the negative underemployment. This was a substantial increase over the 1,895 new veterinarians needed in 2015 and the 1,713 new veterinarians who would have been needed in 2014.

While the majority of veterinarians are content with their current number of work hours per week, 10.6 percent indicated a desire to increase the number of hours per week for increased compensation, while 19.6 percent indicated a desire to reduce the number of hours worked per week for reduced compensation.

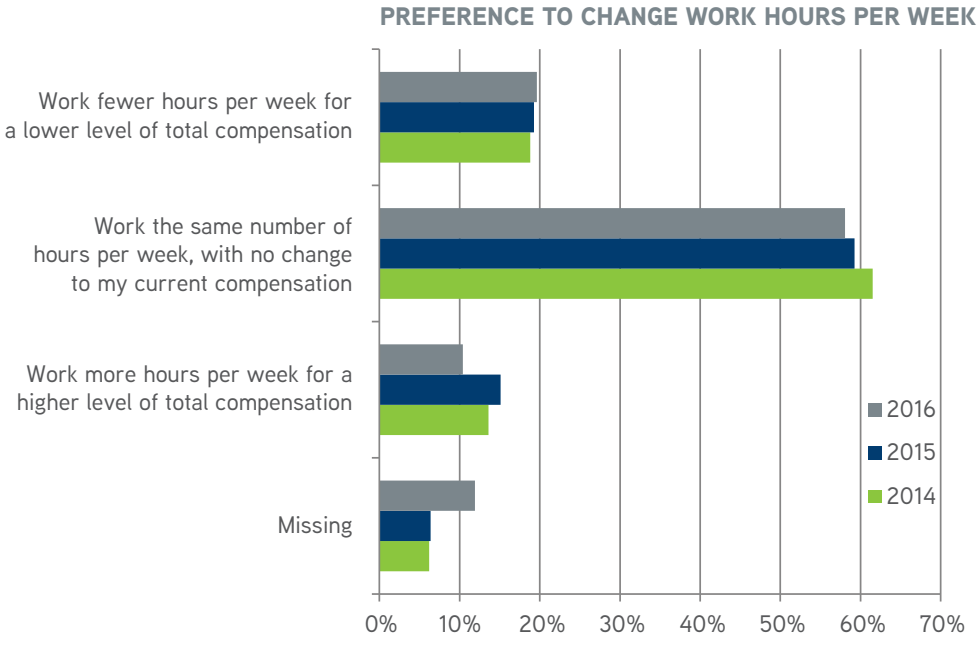



Figure 21

As with unemployment, underemployment varies by gender, region and practice type. More females want to work fewer hours than want to work additional hours, but for the first time since we have measured underemployment, the percent of men who wish to work less is also greater than the percent who wish to work more hours per week.

**UNDEREMPLOYMENT BY GENDER**

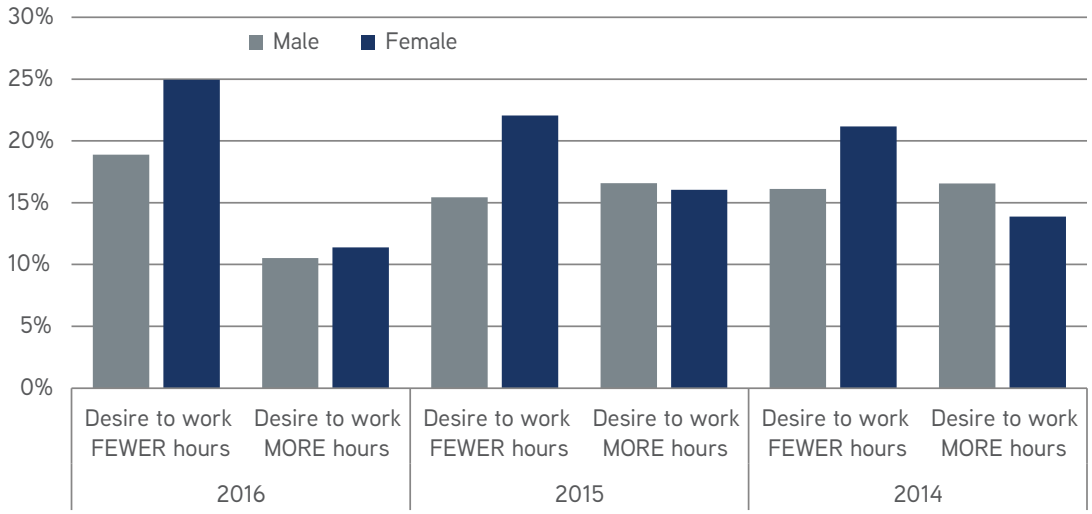



Figure 22

Geographically, most of the regions followed the national trend with more veterinarians wanting to work fewer hours than the number of veterinarians wanting to work additional hours. However, in the Northeast (Region 0), the Mid-Atlantic (Region 2), the Southeast (Region 3) and the Midwest (Region 6) there are more veterinarians who wish to work additional hours than those wishing to work fewer hours. This disparity in underemployment across regions illustrates the problem of geographical maldistribution and suggests a need for greater mobility within the profession.

**UNEMPLOYMENT BY REGION**

| | AVMA Database | Work fewer hours | Work more hours |
|---|---|---|---|
| Region 0 | 4.1% | 11.8% | 16.2% |
| Region 1 | 8.5% | 7.5% | 7.3% |
| Region 2 | 9.3% | 8.2% | 9.6% |
| Region 3 | 14.4% | 7.4% | 14.2% |
| Region 4 | 10.1% | 7.9% | 5.0% |
| Region 5 | 8.3% | 6.8% | 6.6% |
| Region 6 | 8.8% | 6.1% | 7.3% |
| Region 7 | 12.1% | 18.1% | 12.6% |
| Region 8 | 7.1% | 15.3% | 11.3% |
| Region 9 | 13.5% | 9.9% | 8.9% |
| Outside U.S. | 4.0% | 1.1% | 1.0% |
| **Total** | **100.0%** | **100.0%** | **100.0%** |

Table 22

Underemployment by practice type also generally followed the national trend with most practice types having more veterinarians that wish to work fewer hours for less compensation than those who wish to work more hours for more compensation.

**UNDEREMPLOYMENT BY FIRST VETERINARY POSITION**

| | AVMA Database | Work fewer hours | Work more hours |
|---|---|---|---|
| Food Animal Practice (Exclusive) | 1.6% | 22.0% | 9.8% |
| Food Animal Practice (Predominant) | 4.8% | 20.8% | 14.3% |
| Mixed Practice | 3.8% | 23.9% | 8.7% |
| Companion Animal Practice (Predominant) | 7.6% | 22.9% | 12.0% |
| Companion Animal Practice (Exclusive) | 53.2% | 24.1% | 10.2% |
| Equine Practice | 4.2% | 23.4% | 15.3% |
| Federal Government (Civil Service) | 2.6% | 10.5% | 15.8% |
| Uniformed Services | 0.6% | 13.0% | 10.9% |
| College or University (Faculty or Staff Only) | 7.9% | 19.1% | 9.2% |
| State/Local Government | 1.3% | 9.1% | 9.1% |
| Industry/Commercial Organization | 3.8% | 13.8% | 13.8% |
| Not-For-Profit Organization | | 20.0% | 14.3% |
| Currently Participating In Internship/Residency | | 32.1% | 14.1% |
| Currently Pursuing Advanced Education | | 20.0% | 40.0% |
| Other | 8.6% | 5.9% | 17.6% |
| **Total/Average** | **100.0%** | **22.9%** | **10.9%** |

Table 23

The number of hours respondents indicated they currently work varied widely, ranging from one hour to 100 hours, but the majority of respondents (67.4 percent) indicated their current hourly work weeks were predominately in the five-hour increments between 30 and 60 hours per week. And, as might be expected there were a higher percentage of respondents who currently work more than 40 hours per week who wish to reduce the number of hours worked per week for less compensation than there are those who wish to increase the number of hours worked per week for more compensation. The reverse was also true. Among those working fewer than 40 hours per week, there was a higher percentage who wished to work more hours per week for greater compensation than those who wish to work less for less compensation. But this differed slightly by gender.

## CHANGE IN HOURS DESIRED AND CURRENT HOURS WORKING

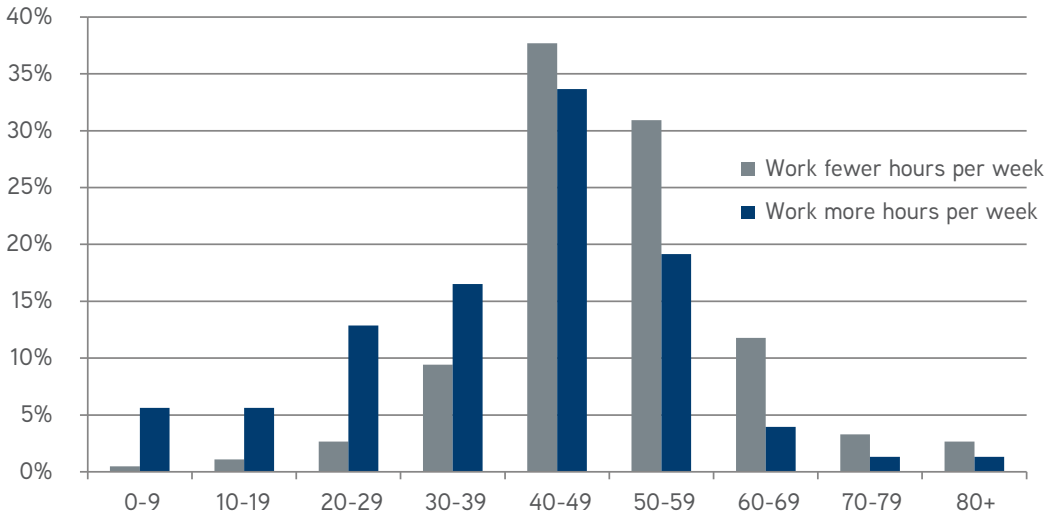



Figure 23

The difference in the preference of hours worked by gender over the last three years illustrates the constant growth in the percentage of female veterinarians who wish to work fewer hours for less compensation. And, for both men and women, the desire to work more hours fell considerably in 2016 compared to the previous two years.

The distribution of number of hours of increase or decrease to reach respondents' desired number of hours per week provides a broader view of the underemployment in the profession. In 2015, the largest percentage of those who wished to adjust the hours per week sought 10 to 19 hours more or less to work. Women had a higher percentage that desired to reduce their weekly hours of work by 10-19 hours while men had a higher percentage that sought to increase their hourly work week by 10-19 hours per week.

There is also a significant difference in the hours desired across gender, particularly within the group of veterinarians working between 40-49 hours per week. Among veterinarians working between 40 and 49 hours per week, more than 40 percent of males want to work more hours while more than 40 percent of females want to work fewer hours. Almost 40 percent of males working between 50 and 59 hours per week want to work fewer hours while almost 30 percent of females in the same category want to work fewer hours.

## MALE WORK PREFERENCE

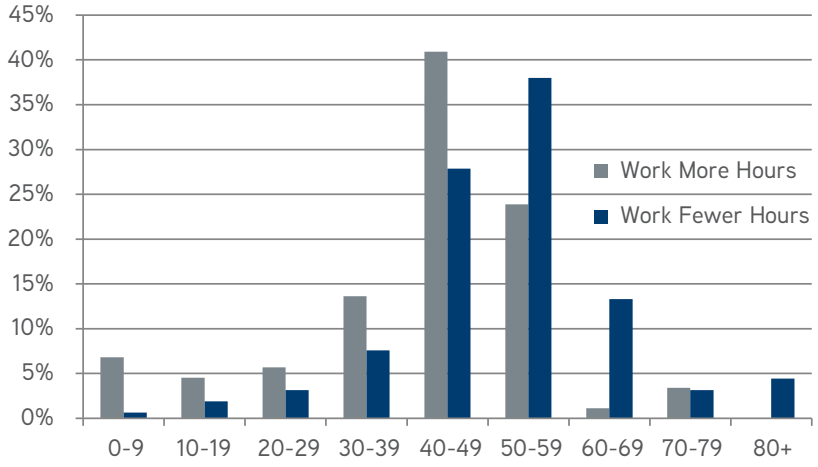



Figure 24

## FEMALE WORK PREFERENCE

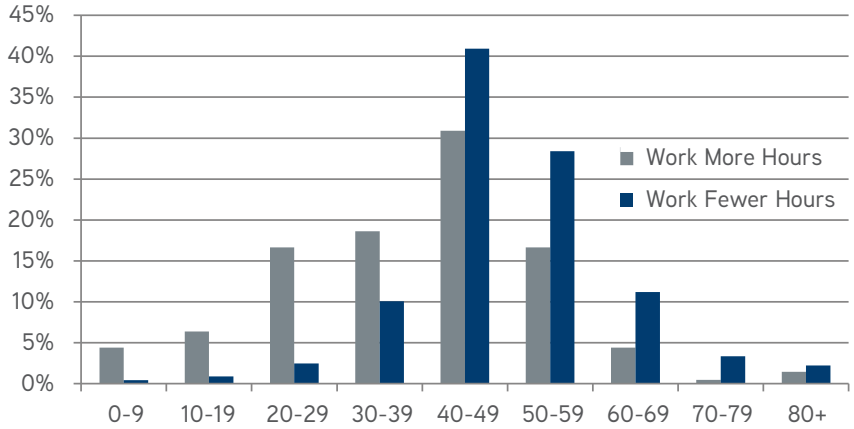



Figure 25

In 2016, the distribution of change in hours among those veterinarians who desired to change their hourly work week varied from a reduction of 49 hours per week to an increase of 50 hours per week from their current hourly work week, just as occurred in 2015. For both men and women in 2016, however, more than 30 percent desired a reduction in hours per week of 10 to 19 hours while approximately 5 percent or less desired an increase of 10 to 19 hours, a substantial decline compared to the more than 20 percent that in 2015 desired this amount of hours increased.

**CHANGE IN HOURS DESIRED BY GENDER, 2016**

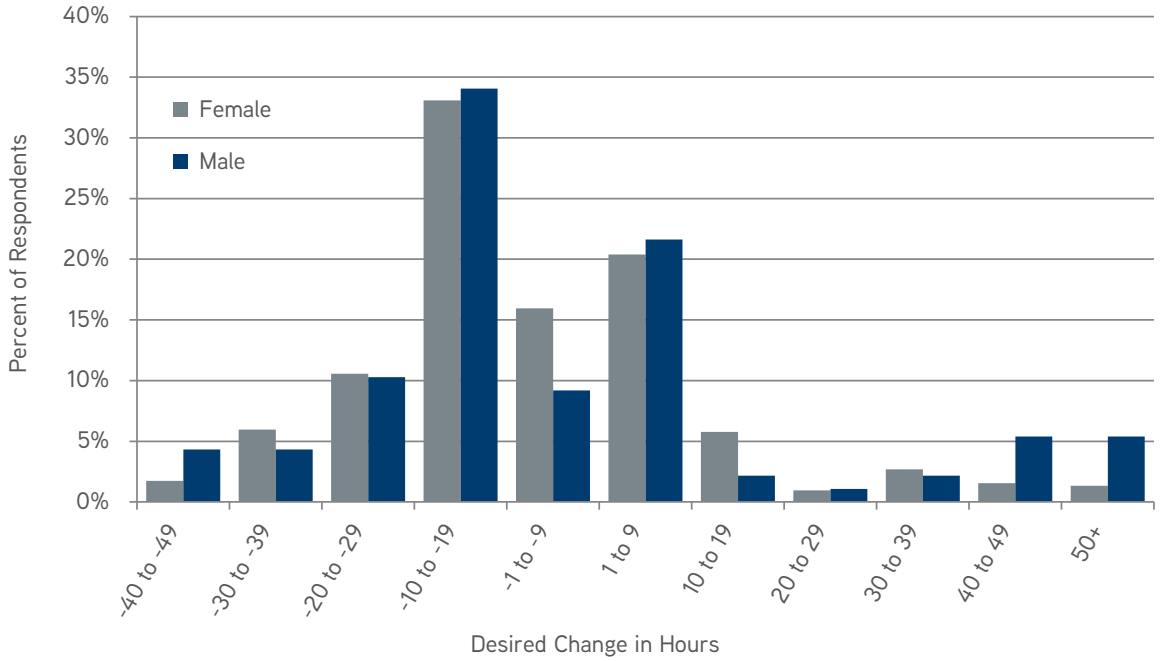



Figure 26

Of the veterinarians who desire a reduction in the number of hours they work per week with a consequence of lower compensation, the mean number of hours that they would like to work weekly, as a group, is less than 40 hours per week. This is in contrast to the group that wants to increase the hours they work to more than 50 hours a week accompanied by increased compensation.

The distribution of the desired hourly work per week reflects what each respondent claimed to be their ideal. For those who did not indicate a desire to either increase or decrease their current hours, the current hours worked was used as their desired level. For those who wished to increase or decrease their hours worked per week, the desired change was added to their current hours to obtain their desired hourly work week.

The difference between genders is observable in the distribution for both 2015 and 2016: The majority wished to work 40-49 hours per week (roughly 35 percent in 2015 and 39 percent in 2016). In 2015 the desired number of hours per week was normally distributed for women however, with roughly 30 percent wanting to work fewer hours and 30 percent wanting to work more than 40 to 49 hours per week. This changed in 2016 with 36 percent wishing to work less and 25 percent wishing to work more than the 40 to 49 hours per week.

In 2015, 46 percent of men desired a work week in excess of 40 to 49 hours while only 19 percent wanted to work fewer hours. In 2016 this wide variation declined, however, as only 38 percent indicated that the optimum hours per week exceeded 40 to 49 hours while 24 percent wished to work less than 40 to 49 hours per week.

**NET HOURS DESIRED BY GENDER, 2016**

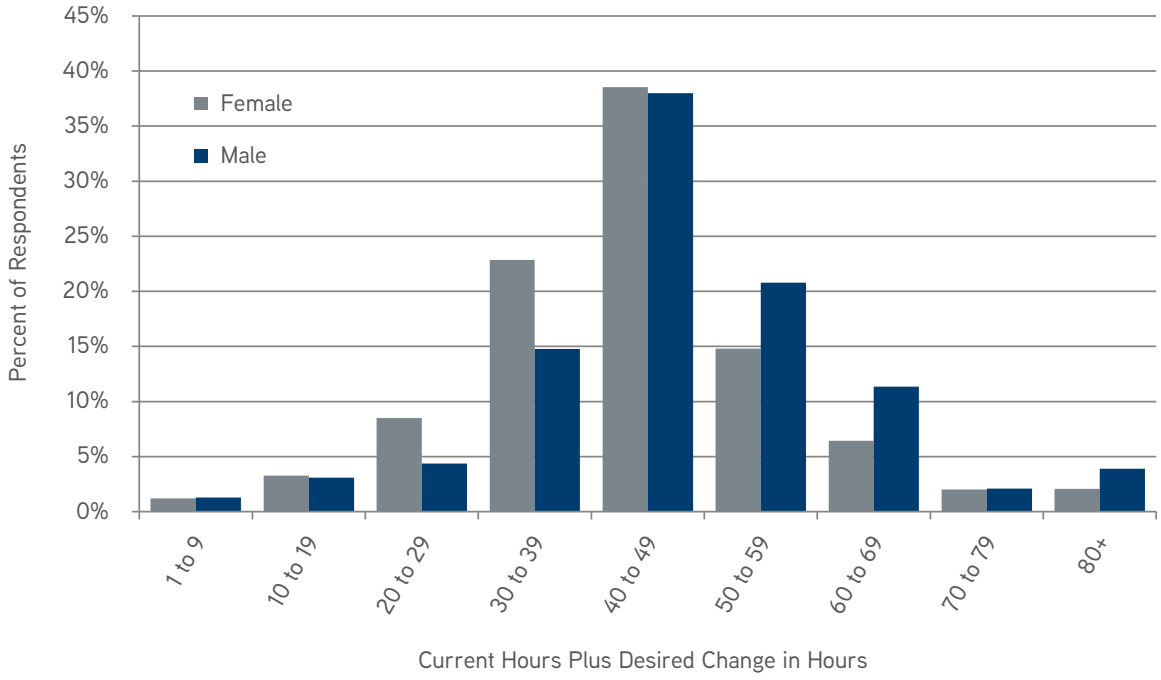



Figure 27

Taking apart the desired change in hours worked by gender and graduation period for those who wish to work more versus those who wish to work less provides greater detail for understanding the distribution of underemployment in the profession.

For nearly every age of female veterinarians, those who wish to reduce the hours per week worked for less compensation exceeded the number of those who wished to increase the number of hours worked per week for increased compensation. However, the percentage of those who wish to reduce their hourly work week has declined in the groups that graduated in 2000-2009 and 1990-1999.

**FEMALE WORK PREFERENCE:**
**DESIRE TO WORK *FEWER* HOURS PER WEEK**

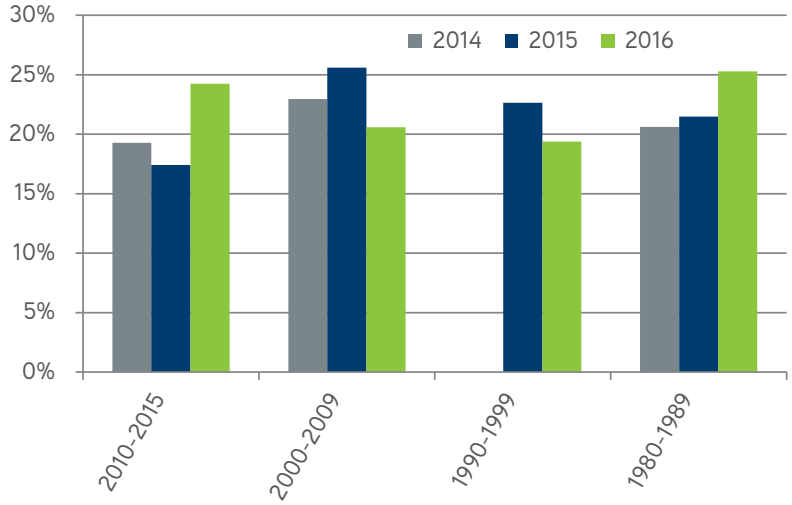



Figure 28

The percentage of female veterinarians that wish to work more hours per week for greater compensation declined across all graduation periods over the last three years. And, a smaller percentage of female veterinarians desired an increase in the hourly work week as they got further away from their graduation year.

**FEMALE WORK PREFERENCE:**
**DESIRE TO WORK *MORE* HOURS PER WEEK**

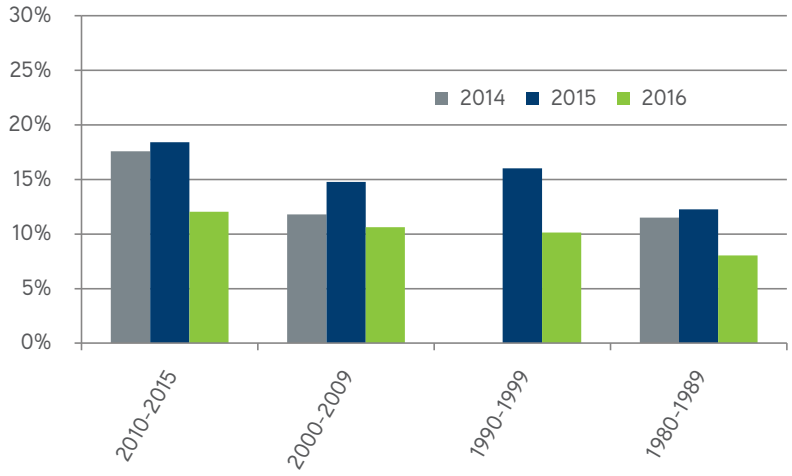



Figure 29

For the first time in three years male veterinarians in each of the graduation periods had a higher percentage of respondents that wished to work fewer hours for less compensation than wished to work more hours for more compensation. And, the pattern of those wishing to work fewer hours changed from a declining percentage of veterinarians in the older the graduation period to an increasing percentage of veterinarians that wish to work fewer hours in the older the graduation period. However, the percentage of veterinarians that wish to work more hours did decline as the graduation period became older.

**MALE WORK PREFERENCE:**
**DESIRE TO WORK *FEWER* HOURS PER WEEK**

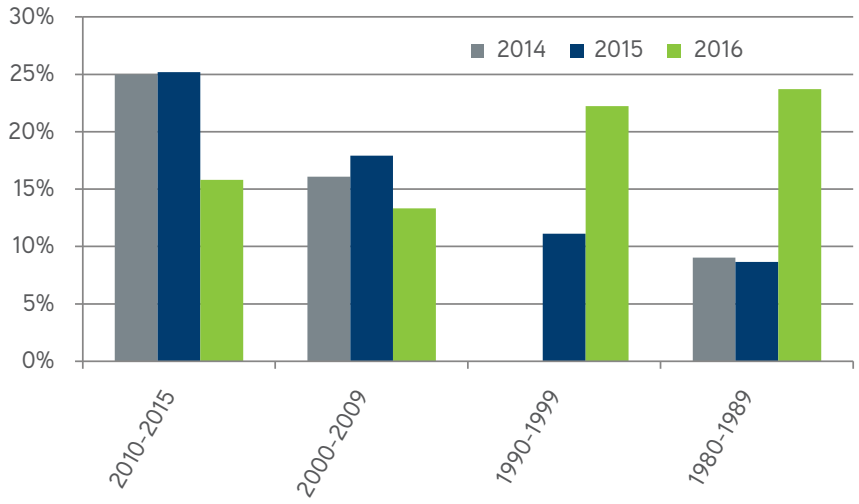



Figure 30

**MALE WORK PREFERENCE:**
**DESIRE TO WORK *MORE* HOURS PER WEEK**

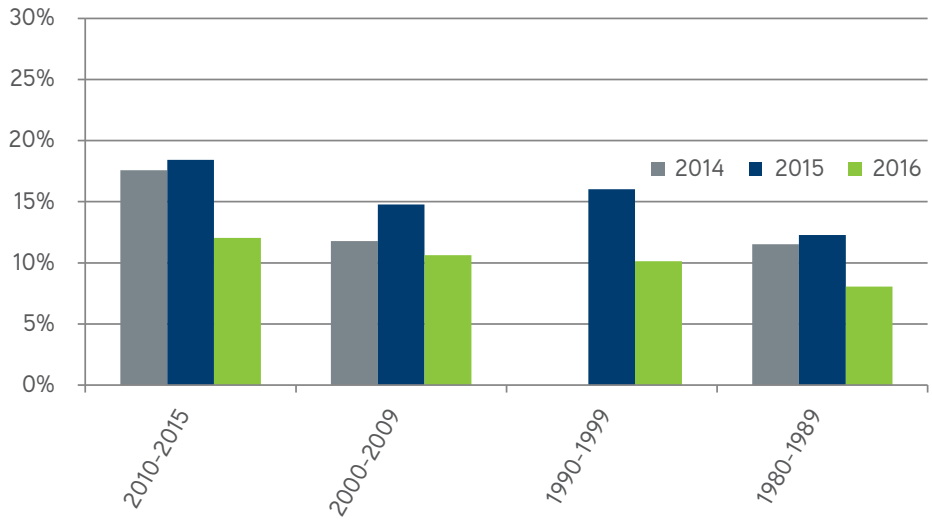



Figure 31

In summary, the veterinary profession does not have a problem with underemployment, according to the results of the 2016 Census Survey, but rather with negative underemployment. There are more veterinarians who wish to work fewer hours than those who wish to work additional hours. If the hours of all veterinarians could be adjusted to align the hours that they wish to work with the hours they actually work, 3,391 additional veterinarians would be required to fill the void. Unfortunately, this presents an unattainable solution because it would require these additional veterinarians to work in multiple practices and geographic areas simultaneously. That is, of course, unless a specific employer had numerous veterinary employees working more hours than they desired, and this is unlikely to be the case. More typically, the indivisibility of veterinary labor (or that of any professional) most typically comes in blocks of 40-50 hours. A veterinary employer who may only have 20-30 hours of negative underemployment of veterinarians in their practice would probably opt for hiring a new veterinarian, thereby creating a condition of underemployment and excess capacity. When there are multiple practices in an area that have veterinarians who wish to work less for less compensation, however, a single veterinarian may work for different practices to reach their desired level of hours and compensation.

The level of underemployment differed by practice type, with some practice types having positive net underemployment (e.g., equine, food animal exclusive, state and local government, and other veterinary sector) and other practice types having negative net underemployment. For the first time since AVMA Economics began tracking underemployment, the percent of veterinarians who wish to work less exceeded the percent who wish to work more in all private practice types, with the exception of federal and the category of other types of employment.

**WORK PREFERENCE BY PRACTICE TYPE, 2016**

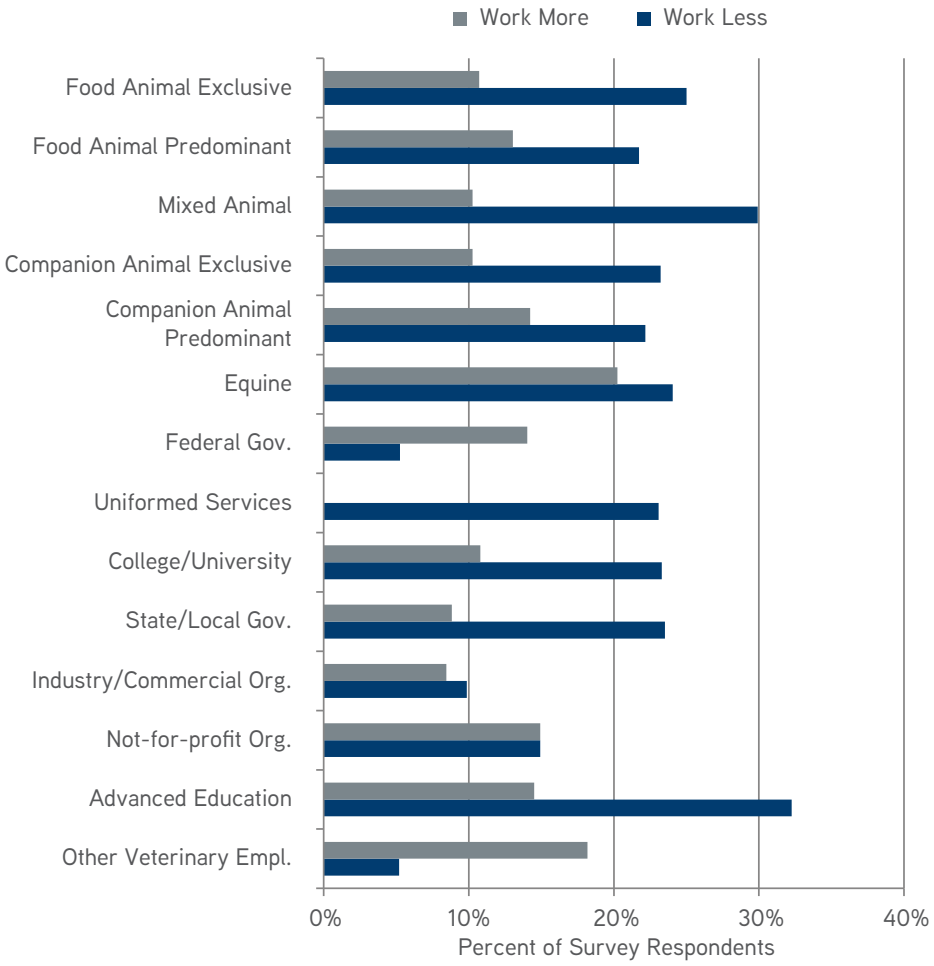



Figure 32

## UNDEREMPLOYMENT BY VETERINARY COLLEGE

| | 2016 | | | 2015 | | |
|---|---|---|---|---|---|---|
| | Mean change in hours desired | N | Std. Deviation | Mean change in hours desired | N | Std. Deviation |
| Auburn University | 1.57 | 23 | 21.94 | 1.52 | 54 | 6.35 |
| Colorado State University | -8.89 | 68 | 15.32 | -0.8 | 99 | 9.45 |
| Cornell Veterinary College | -5.44 | 25 | 15.59 | -0.82 | 78 | 9.88 |
| Tufts University | -4.67 | 26 | 15.23 | -2.42 | 66 | 7.92 |
| Iowa State University | -4.45 | 30 | 16.39 | -1.22 | 103 | 9.30 |
| Kansas State University | -1.30 | 30 | 21.25 | -2.21 | 68 | 8.39 |
| Louisiana State University | -4.26 | 21 | 17.92 | -1.35 | 47 | 7.68 |
| Michigan State University | -3.61 | 36 | 15.69 | 0.12 | 89 | 8.35 |
| Mississippi State University | 4.22 | 16 | 21.10 | -0.7 | 30 | 8.06 |
| North Carolina State University | 3.26 | 21 | 25.92 | -1.56 | 70 | 8.57 |
| Oklahoma State University | -8.52 | 26 | 15.06 | -0.62 | 45 | 8.85 |
| Oregon State University | -5.88 | 12 | 20.46 | -1.39 | 33 | 8.69 |
| Other (please specify): | 0.54 | 74 | 28.65 | 0.97 | 106 | 9.96 |
| Purdue University | -10.93 | 28 | 14.80 | 0.85 | 52 | 8.54 |
| Ross University | -0.69 | 45 | 27.42 | -0.32 | 109 | 7.11 |
| St. George's University | -3.67 | 12 | 24.54 | 0.63 | 30 | 10.93 |
| St. Matthew's University | 1.00 | 2 | 15.56 | 3.36 | 11 | 15.70 |
| Texas A&M University | -7.77 | 86 | 17.91 | -0.9 | 79 | 5.76 |
| The Ohio State University | -8.03 | 45 | 14.04 | -0.07 | 101 | 8.48 |
| Tuskegee University | 0.19 | 13 | 28.56 | 0.08 | 26 | 8.23 |
| University of California-Davis | -5.34 | 28 | 18.70 | -1.63 | 96 | 9.34 |
| University of Florida | -4.29 | 14 | 15.77 | -3.05 | 40 | 8.20 |
| University of Georgia | -11.43 | 21 | 9.38 | -1.13 | 68 | 11.32 |
| University of Illinois | -6.82 | 31 | 18.43 | -2.6 | 78 | 7.25 |
| University of Minnesota | 0.69 | 21 | 20.26 | -0.83 | 69 | 9.04 |
| University of Missouri-Columbia | -9.91 | 23 | 19.40 | -1.61 | 66 | 9.41 |
| University of Pennsylvania | 0.14 | 35 | 19.08 | -0.57 | 75 | 8.38 |
| University of Tennessee | -4.04 | 24 | 19.39 | 0.15 | 54 | 8.56 |
| University of Wisconsin | -8.62 | 26 | 14.49 | 0.16 | 64 | 10.80 |
| Virginia-Maryland College | -6.17 | 21 | 15.81 | -1.54 | 80 | 7.64 |
| Washington State University | -1.12 | 21 | 22.92 | -1.64 | 66 | 7.00 |
| Western University - California | 3.25 | 12 | 30.37 | -1.59 | 29 | 8.85 |
| **Total** | **-4.42** | **916** | **19.96** | **-0.81** | **2,081** | **8.72** |

Table 24

Significant at the 10-percent level, there is no difference in underemployment among colleges. Tabulations show that graduates of Mississippi State University and North Carolina State University desired the largest mean increase in hours per week, 4.22 and 3.26 respectively. Graduates of the University of Georgia and Purdue University desired the largest mean decrease in hours, 11.43 and 10.93 respectively. The work preference of all other colleges fell within that range.

## Veterinarians Who Wish to Work More (Underemployment)

Within the 2016 sample, 10.4 percent (15.0 percent in 2015) of veterinarians indicated wanting to work a mean of 18.9 (11.6 in 2015) additional hours per week. The pattern of an increasing percentage of respondents who wish to work more hours decreasing with more years since graduation has been continuous through the periods of data collection. However, the decline in the percent of respondents who indicated they wish to work more hours for more compensation occurred in all graduation periods and for both genders.

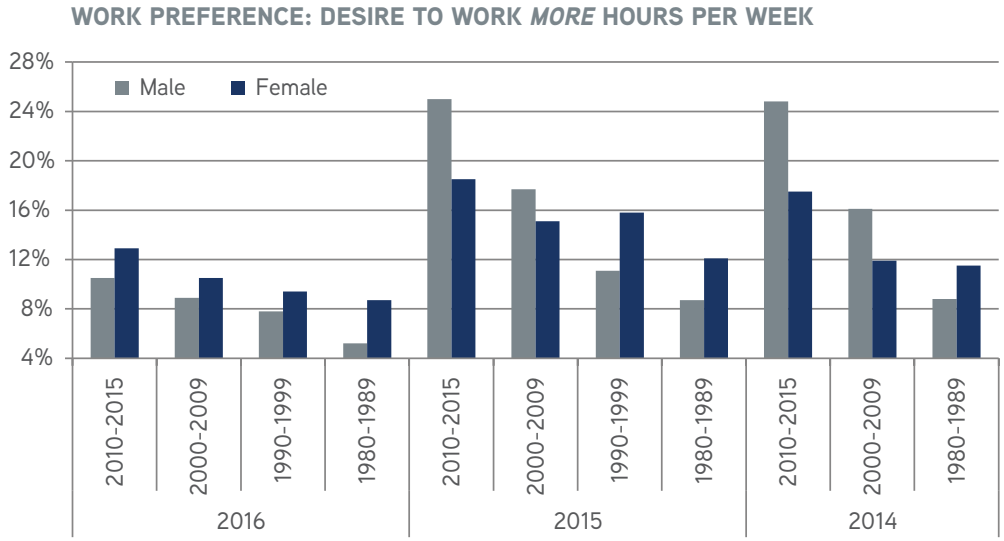



Figure 33

**THE PATTERN OF AN INCREASING PERCENTAGE OF RESPONDENTS WHO WISH TO WORK MORE HOURS DECREASING WITH MORE YEARS SINCE GRADUATION HAS BEEN CONTINUOUS THROUGH THE PERIODS OF DATA COLLECTION.**

Females wishing to work more comprised 7.4 percent of the sample, and the mean number of hours currently worked by this group was 37.5 in 2016 (38.4 in 2015) and the mean number of hours per week the group wished to work increased to 53.8 hours (49.6 in 2015). On the other hand, men who wish to work additional hours comprised only 3.0 percent of the sample. This group currently works 41.8 hours per week (45.0 hours in 2015) and wish to increase that to 66.7 hours per week (56.3 hours in 2015).

**UNDEREMPLOYMENT BY GENDER, 2015**

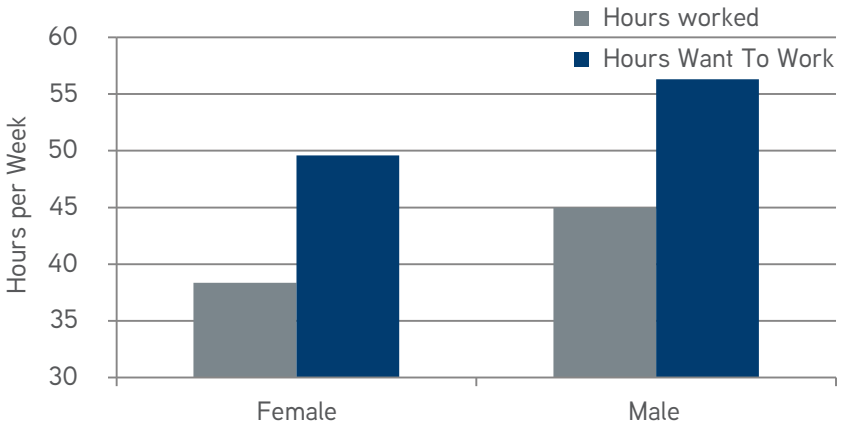



Figure 34

**UNDEREMPLOYMENT BY GENDER, 2016**

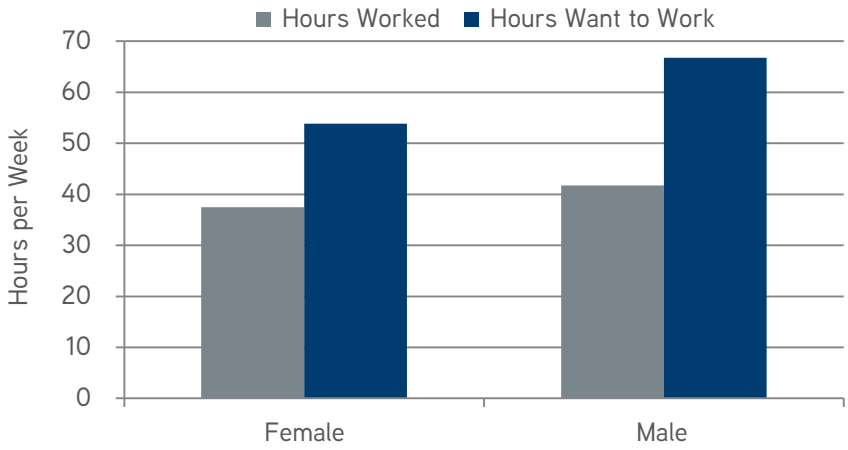



Figure 35

The level of underemployment for those who wish to work more hours for greater compensation also varies by practice type. In 2015, food animal practitioners (predominant), mixed animal and those veterinarians in advanced education who wished to work more hours reported a mean hourly work week of more than 50 hours per week and on average were looking to increase that hourly work week to more than 60 hours per week. In 2016, the veterinarians who wished to work more hours in all of the practice types had a mean hourly work of less than 50 hours, with the equine practitioners having the only mean current hourly work week above 45 hours per week (48.2 hours). For the most part, however, female veterinarians who indicated they wish to work more hours were working fewer than 40 hours per week and wish to increase their hourly work week to more than 50 hours per week.

Of those veterinarians who desired to work more hours, the group in "other employment" work the fewest hours per week currently (33.5 hours per week) and indicated a desire to move to a 42 hour work week. The low number of respondents in some of the categories and high standard deviations suggest caution in using the means to describe the situation of those considered underemployed. The values reflect the great diversity in and between the types of practices.

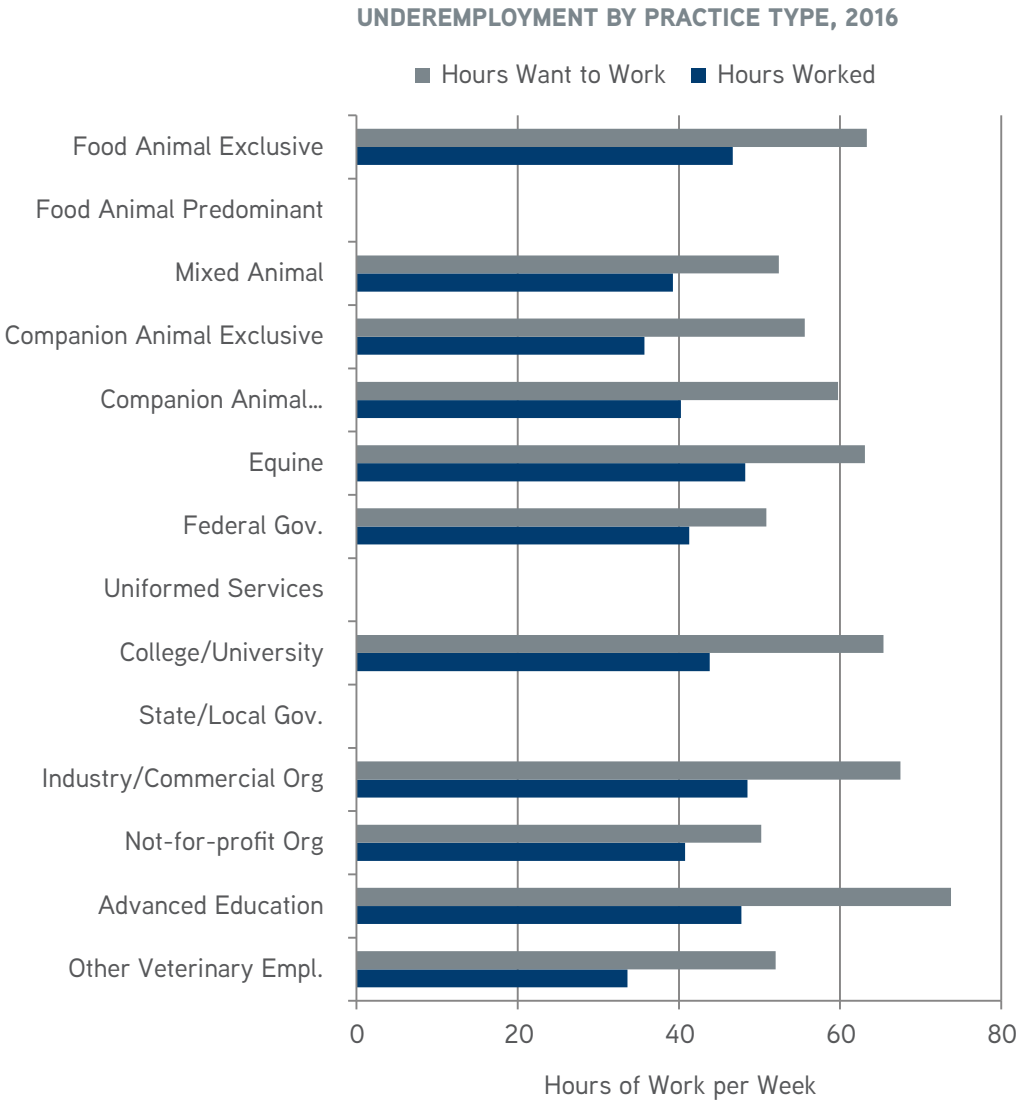



Figure 36

Across regions, veterinarians who wish to work additional hours for increased compensation are generally working a full-time, 40-hour work week, but wish to expand this to more than 50 hours per week. As with the underemployment data by practice type, the standard deviations for both the current hours worked and the additional hours veterinarians would like to work are very high and point to the large diversity in work hours within regions.

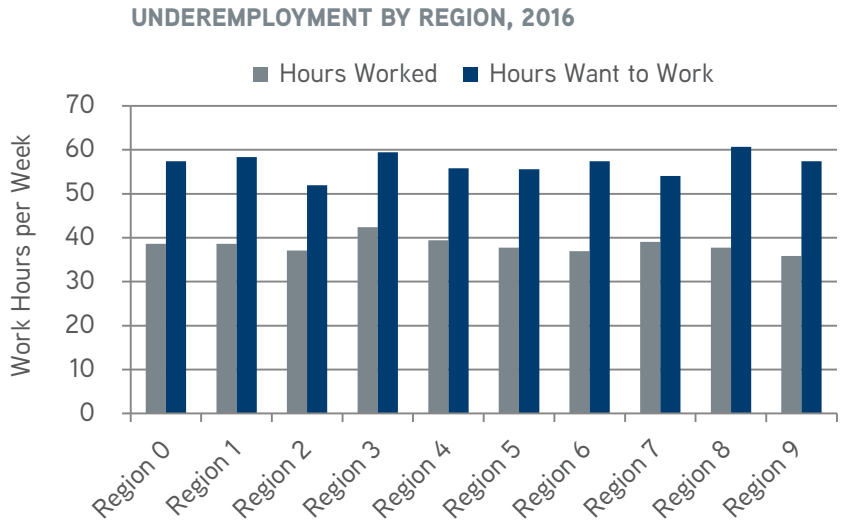



Figure 37

## Veterinarians Who Wish to Work Less (Negative Underemployment)

In contrast to those who indicated a desire to work more hours for increased compensation, in 2016, 20.6 percent (18.7 percent in 2015) of the respondents indicated wanting to work an average of 14.9 hours less per week for less compensation (12.7 hours in 2015).

As with the percentage of respondents who wished to work more hours per week, the percentage of veterinarians who indicated that they would like to work fewer hours per week represented a major change from the previous two years. Those who have the greatest distance from graduation had the highest percentage of veterinarians who wished to cut back on their hourly work week.

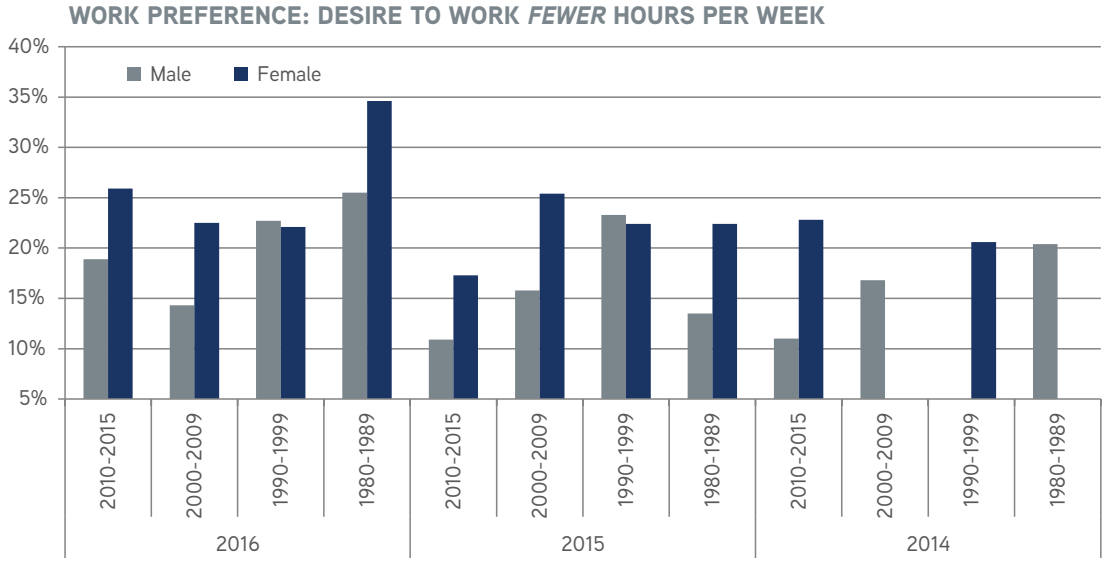



Figure 38

Females wishing to work fewer hours comprised 15.5 percent of the sample and the mean number of hours currently worked by this group was 47.6 in 2016 (48.9 in 2015) and the mean number of hours per week the group wished to work decreased to 33.1 hours (35.9 in 2015). On the other hand, men who wish to work fewer hours comprised only 5.1 percent of the sample. This group currently works 52.0 hours per week (52.2 hours in 2015) and wish to decrease that to 35.7 hours per week (37.8 hours in 2015).

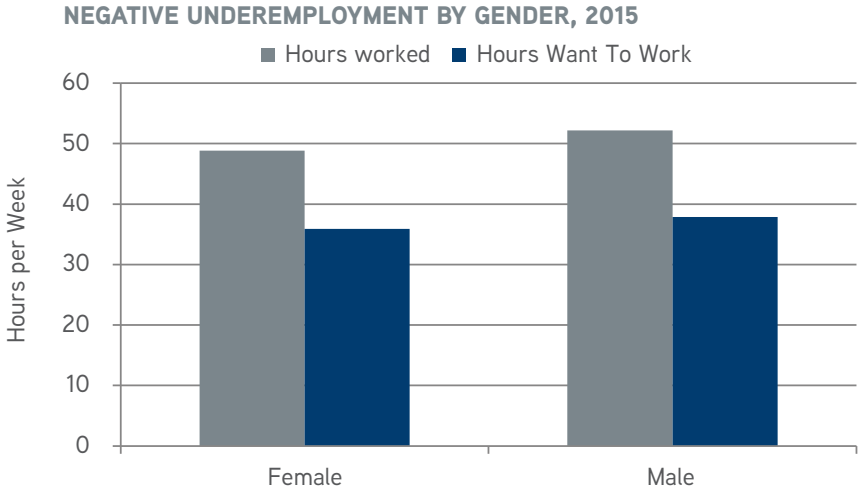



Figure 39

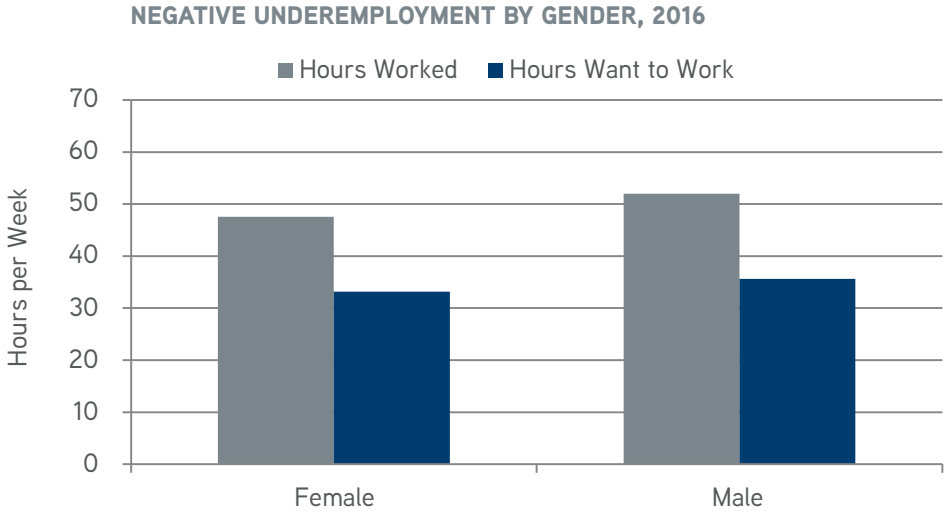



Figure 40

The group that wishes to work less is working roughly 10 hours more per week (48.6 versus 38.8) than the group that wishes to work more. And both want to change their work hours per week by 15 hours or more. However, because 465 veterinarians in the sample (20.6 percent) desire to work less (351 in 2015) and this exceeds the 239 veterinarians who desire to work more (253 in 2015), and those who want to work less desire to reduce their work week by 14.9 hours (12.86 hours in 2015) while those who want to work more want to increase their work week by 18.9 hours (12.51 hours in 2015), the total level of underemployment in the profession is negative. A negative underemployment indicates the need to add veterinarians to the workforce. Because this negative underemployment occurs in different practice types and regions of the country and may not be sufficiently large enough in any specific local area and practice type, however, adding an additional veterinarian in any specific practice or place of employment may not be feasible and thus this measure of negative underemployment cannot be used to define a level of excess demand. Indeed, this misdistribution of underemployment and negative underemployment illustrates the importance of labor indivisibility in the veterinary profession.

For the group of veterinarians who want to work fewer hours for less compensation, gender differences are less pronounced than for those who wish to work more hours. For both males and females, the average number of hours currently working is near 50 while the hours they wish to work is less than 40.

Differences in the current work week of veterinarians reporting they wish to work fewer hours for lower compensation are dramatic, with food animal predominant veterinarians and those in advanced education indicating a mean current hourly work week exceeding 60 hours and a desire to reduce this by a sufficient number of hours to move closer to the 40-45 hour work week. As in 2015, however, equine practitioners who wished to work fewer hours for less compensation wanted the greatest mean reduction in hours per week (23.3 hours) while food animal practitioners who sought fewer hours per week with a reduction in compensation sought the lowest hourly work week reduction (12 hours).

**NEGATIVE UNDEREMPLOYMENT BY PRACTICE TYPE, 2016**

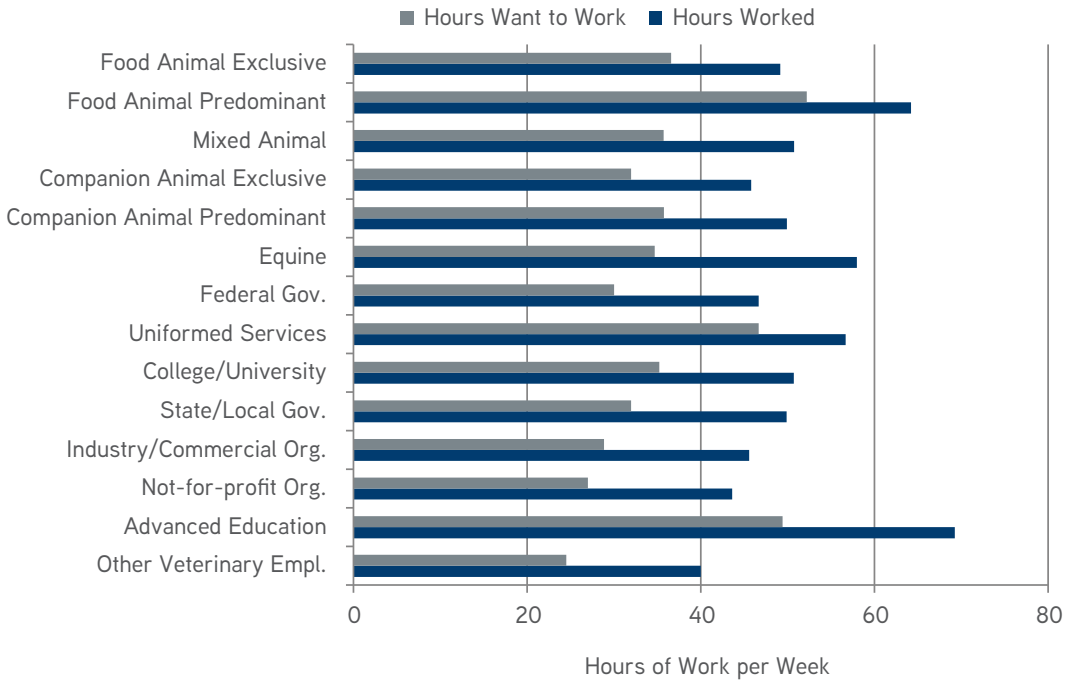



Figure 41

While there were considerable differences in underemployment by practice type, there was little difference across regions. In general, for veterinarians who indicated a desire to reduce their hourly work week for less compensation, the average current hourly work week in each region was near the 50-hour mark. These veterinarians wished to reduce their hourly work week to get under the 40-hour work week. Region 2 had the lowest mean number of hours worked per week at 45.6 hours and also the smallest mean desired reduction in hours worked of 13.2 hours. Conversely, Region 0 had the highest mean hourly work week (53.0 hours) and the largest mean desired reduction in hours worked (17.0 hours).

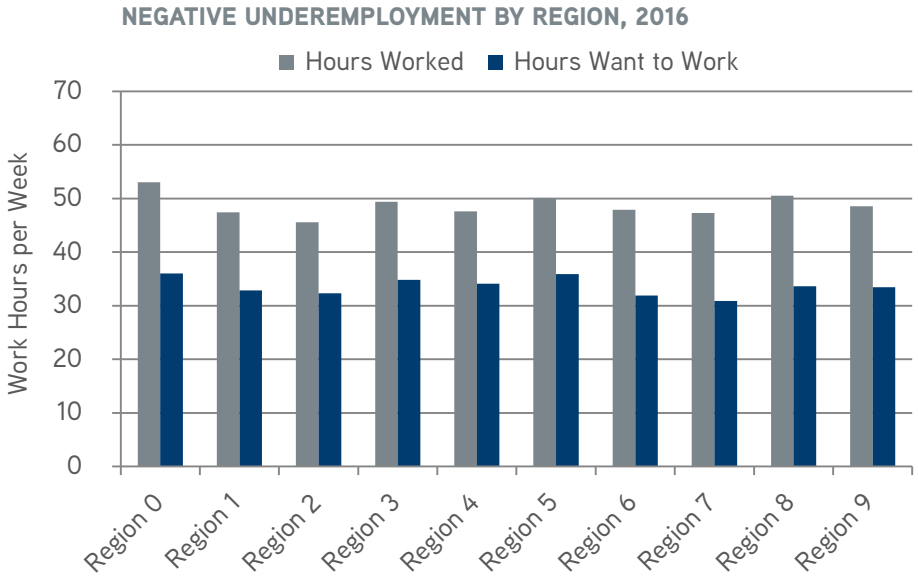



Figure 42

**WHILE THERE WERE CONSIDERABLE DIFFERENCES IN UNDEREMPLOYMENT BY PRACTICE TYPE, THERE WAS LITTLE DIFFERENCE ACROSS REGIONS.**

## Factors correlated with underemployment

Following the methods used to identify the factors that are correlated with employment, a similar method was used to determine the factors that are correlated with underemployment. In the following estimated equation, we identify factors that affect the number of hours veterinarians work. An ordinary least squares regression was estimated and included the following variables: veterinary practice type, graduating university, workplace location, gender, internship participation, debt, board certification, marital status, mobility and health.

An ordinary least squares regression is an equation in which unknown parameters are estimated such that the difference between observed and predicted variables is minimized. The resulting model can be expressed in a formula such that controlled variations in the independent variables are used to predict the dependent variable (the variable being explained). The dependent variable in the following regression is the number of hours the respondent wants to add or subtract from his current workload. He or she is willing to take a pay cut to

**FACTORS CORRELATED WITH UNDEREMPLOYMENT**

| Dependent Variable: Desired Change in Work Hours per Week | | | | |
|---|---|---|---|---|
| | Coef. | Std. Err. | z | P>z |
| DVM | 2.5 | 2.5 | 1.03 | 0.305 |
| DVM + Ph.D. | 4.7 | 4.5 | 1.05 | 0.291 |
| DVM + M.S. | 3.5 | 1.8 | 1.9 | 0.058 |
| DVM + Specialized degree (J.D., M.D., E.D.) | -20.5 | 11.1 | -1.84 | 0.065 |
| Homeowner | 0.7 | 1.8 | 0.42 | 0.674 |
| Male | 6.4 | 1.7 | 3.7 | 0 |
| Years of Experience | -0.2 | 0.1 | -2.05 | 0.04 |
| Married | -1.5 | 1.7 | -0.88 | 0.379 |
| Want to change living location | -0.3 | 1.5 | -0.17 | 0.865 |
| Children | -1.9 | 1.6 | -1.2 | 0.232 |
| Health 1 - Poor | -0.3 | 10.7 | -0.02 | 0.981 |
| Health 2 - Fair | -3 | 3 | -1 | 0.318 |
| Health 3 - Good | 0.6 | 2 | 0.28 | 0.776 |
| Health 4 - Very Good | -0.7 | 1.8 | -0.37 | 0.71 |
| Health 5 - Excellent (Omitted) | | | | |
| Log of Remaining Educational Debt | 0 | 0.1 | 0.23 | 0.822 |
| Log of Annual Income | -4.1 | 1.7 | -2.42 | 0.015 |
| Practice Owner | 0.8 | 2.1 | 0.37 | 0.714 |
| Specialty/Referral Practice | 1.6 | 2.9 | 0.57 | 0.566 |
| Consultant | 2.1 | 10.2 | 0.21 | 0.835 |
| Emergency | 4.7 | 4.3 | 1.08 | 0.279 |
| Relief | 0 | (omitted) | | |
| Part-time | 4.6 | 2.4 | 1.94 | 0.053 |
| Region 0 | -1.5 | 3.3 | -0.45 | 0.651 |
| Region 1 | -5.3 | 2.6 | -2.04 | 0.042 |
| Region 2 | -2.6 | 2.6 | -1 | 0.317 |
| Region 4 | -3.6 | 2.8 | -1.28 | 0.199 |
| Region 5 | -4.8 | 2.8 | -1.72 | 0.086 |

Table 25

reduce hours and, of course, get an increase in compensation for working additional hours. Variables significant in explaining underemployment or negative underemployment in veterinary medicine are gender, with males wanting to work on average six additional hours per week; region, with veterinarians in Region 6 wanting to work approximately eight hours less; practice, with veterinarians in Federal government wanting to work almost 15 hours more per week and income such that for every 10 percent increase of income above the mean, veterinarians want to work .4 hours (~ 24 mins) less. In the previous year's report, factors identified as significant in explaining the variation to work fewer or more hours were income, satisfaction with employment, gender, practice type and region. With males wanting to work approximately three hours more, veterinarians in state and local government wanting to work 16 hours more, and those in mixed practice wanting to work five hours less. (See the *2016 AVMA Report on Veterinary Markets* for more details.)

| **Dependent Variable: Desired Change in Work Hours per Week** | | | | |
|---|---|---|---|---|
| | **Coef.** | **Std. Err.** | **z** | **P>z** |
| Region 6 | -8.1 | 3 | -2.69 | 0.007 |
| Region 7 | -5.7 | 2.9 | -1.95 | 0.051 |
| Region 8 | -6 | 3 | -1.97 | 0.049 |
| Region 9 | -4.7 | 2.7 | -1.75 | 0.08 |
| Food Animal Exclusive | -0.5 | 5.9 | -0.08 | 0.933 |
| Food Animal Predominant | 9.1 | 6 | 1.51 | 0.131 |
| Mixed Animal | -3.3 | 2.8 | -1.17 | 0.242 |
| Companion Animal Predominant | 3.2 | 2.2 | 1.43 | 0.152 |
| Equine | -4 | 3.4 | -1.19 | 0.234 |
| Federal Gov. | 14.7 | 5.4 | 2.72 | 0.007 |
| Uniformed Services | 0.2 | 10.9 | 0.02 | 0.988 |
| College/University | 1.1 | 2.6 | 0.41 | 0.684 |
| State/Local Gov. | -4.8 | 5.6 | -0.86 | 0.391 |
| Industry/Commercial Org. | 1.2 | 5.5 | 0.22 | 0.823 |
| Not-for-profit Org. | -1.3 | 5.1 | -0.25 | 0.8 |
| Advanced Education | -4.4 | 4.2 | -1.04 | 0.297 |
| Other Veterinary Empl. | 4.6 | 4.7 | 0.97 | 0.333 |
| Non-Veterinary Empl. | -6.4 | 14.8 | -0.43 | 0.665 |
| Constant | 15.2 | 19.2 | 0.79 | 0.429 |
| First-Stage Results: | | | | |
| No. of Weeks Worked In Previous Year | -0.00026 | 0.003768 | -0.07 | 0.946 |
| No. of Hours Per Week | 0.014452 | 0.002092 | 6.91 | 0.000 |
| No. of Emergency Hours Per Week | -0.01161 | 0.003678 | -3.16 | 0.002 |
| Constant | -1.13107 | 0.191358 | -5.91 | 0.000 |
| Rho | 0.958158 | 0.007701 | | |
| Lr Test Of Indep. Eqns. (Rho = 0): Chi2(1) = 139.26 Prob > Chi2 = 0.0000 | | | | |

The results in Table 25 illustrate a Heckman Selection regression model representing the reduction in the number of hours that veterinarians want to work.

This statistical model has two stages. In the first stage, why some veterinarians want to change their hours, and why some do not, is analyzed. We use each individual's number of work weeks in a year (number of weeks minus number of vacation weeks), their average number of hours of work per week, and their average number of emergency work hours per week. This is done to isolate the survey respondents who want to work fewer hours because they already work more than is typically the case. The results of the estimation show that working more regular hours per week is associated with a higher probability of wanting to change the number of hours worked, while working more emergency hours is associated with a lower probability of wanting to change the number of hours worked.

In the second stage of the model, when the effect of work hours on the probability that someone wants to reduce or increase their work hours is already accounted for, coefficients reveal how each of their character traits affect their preference in the number of hours they wish to work. For example, even when considering all of the other factors listed, male veterinarians tend to want to work an average of six more hours per week, while veterinarians in Region 1 want to work 5.3 fewer hours per week. Not all of the factors listed, however, have a statistically significant effect on the desire to change hours worked.

Rho, in the aforementioned table, is the correlation coefficient that measures the independence of the two stages. If rho is statistically significant, with a p-value of less than 0.001, we can conclude that the two stages of the estimation are correlated, and this estimation procedure is valid.

To better understand the variation in underemployment, factors affecting mobility were examined. If the workforce is highly mobile then differences in unemployment rates, underemployment and incomes across regions and within regions between business areas should begin to decline. Factors thought to contribute to reducing job mobility are home ownership, marital status, number of children and preferences for type of community and size of business. These variables, or components of them, are all statistically significant in determining the factors that explain the variation in mobility.

**FACTORS CONSIDERED IN EXPLAINING MOBILITY**

| Logistic regression | Number of Obs. | = | 2,055 | | |
|---|---|---|---|---|---|
| | LR chi2(10) | = | 271.96 | | |
| | Prob > chi2 | = | 0 | | |
| Log likelihood = -1287.804 | Pseudo R2 | = | 0.0955 | | |
| | Odds Ratio | Coefficient | t-statistic | p-value | Probability |
| Homeowner | -1.13556 | 0.116655 | -9.73 | 0 | 837.7% |
| Married | -0.40812 | 0.13332 | -3.06 | 0.002 | -69.0% |
| Separated | -0.15499 | 0.595906 | -0.26 | 0.795 | -18.3% |
| Widowed | -1.00574 | 0.68377 | -1.47 | 0.141 | 17518.6% |
| Divorced | -0.42492 | 0.223473 | -1.9 | 0.057 | -73.9% |
| Children at Home | -0.29504 | 0.107515 | -2.74 | 0.006 | -41.9% |
| Prefer Smaller Community | 0.665218 | 0.169778 | 3.92 | 0 | 39.9% |
| Prefer Larger Community | 0.914956 | 0.139569 | 6.56 | 0 | 47.8% |
| Prefer Smaller Practice | 0.614202 | 0.178776 | 3.44 | 0.001 | 38.0% |
| Prefer Larger Practice | -0.03268 | 0.126056 | -0.26 | 0.795 | -3.4% |
| Constant | 0.971706 | 0.126775 | 7.66 | 0 | 49.3% |
| Omitted categories: single/never married, no children at home, not a homeowner, prefer same size community, prefer same size practice | | | | | |

Table 26

## MALDISTRIBUTION OF VETERINARIANS

The variation in incomes, unemployment and underemployment by region and practice type is descriptive of symptoms of maldistribution. Maldistribution suggests that the spatial distribution by practice type of the supply of veterinarians does not align with the spatial distribution by practice type of demand for veterinarians.

A location quotient can be used to evaluate maldistribution. The location quotient provides a way to quantify the regional concentration of a specific occupation in comparison to the national average. Specifically, a location quotient for veterinarians compares the number of veterinarians as a percent of all employees in a specific area to the number of veterinarians as a percent of all employees in the United States. Thus, a location quotient of one means that the concentration of veterinarians (percent of veterinarians in the workforce) in the local area is equal to the concentration of veterinarians nationally. A location quotient above one suggests the concentration of veterinarians is greater in the area than nationally, and below one suggests that the concentration of veterinarians is less in the area than nationally.

The Bureau of Labor statistics tracks veterinarian employees and has mapped by state the location quotient of these workers (veterinarian practice owners are omitted). Three states and Puerto Rico are shown to have less than the national average concentration of veterinarians while most states have between 0.8 and 1.25 of the concentration of veterinarians compared to the national average. Ten states, however, have between 1.25 and 2.5 times as many veterinarian employees per total employees in the state than occurs on the average nationally. This variation in concentration, all other factors being equal, should align with the income, unemployment and underemployment statistics. Of course, all other factors are not equal. Cost-of-living differences will interfere with income differences between the states and the median household income variation between states will affect the demand for veterinarians as will the number of pets per household and the extent of the human-animal bond of those pet-owning households. Finally, because practice owners are not included in this location quotient, the average number of veterinarians per practice will also affect the quotient.

**LOCATION QUOTIENT OF AVMA VETERINARIANS BY STATE, 2015**

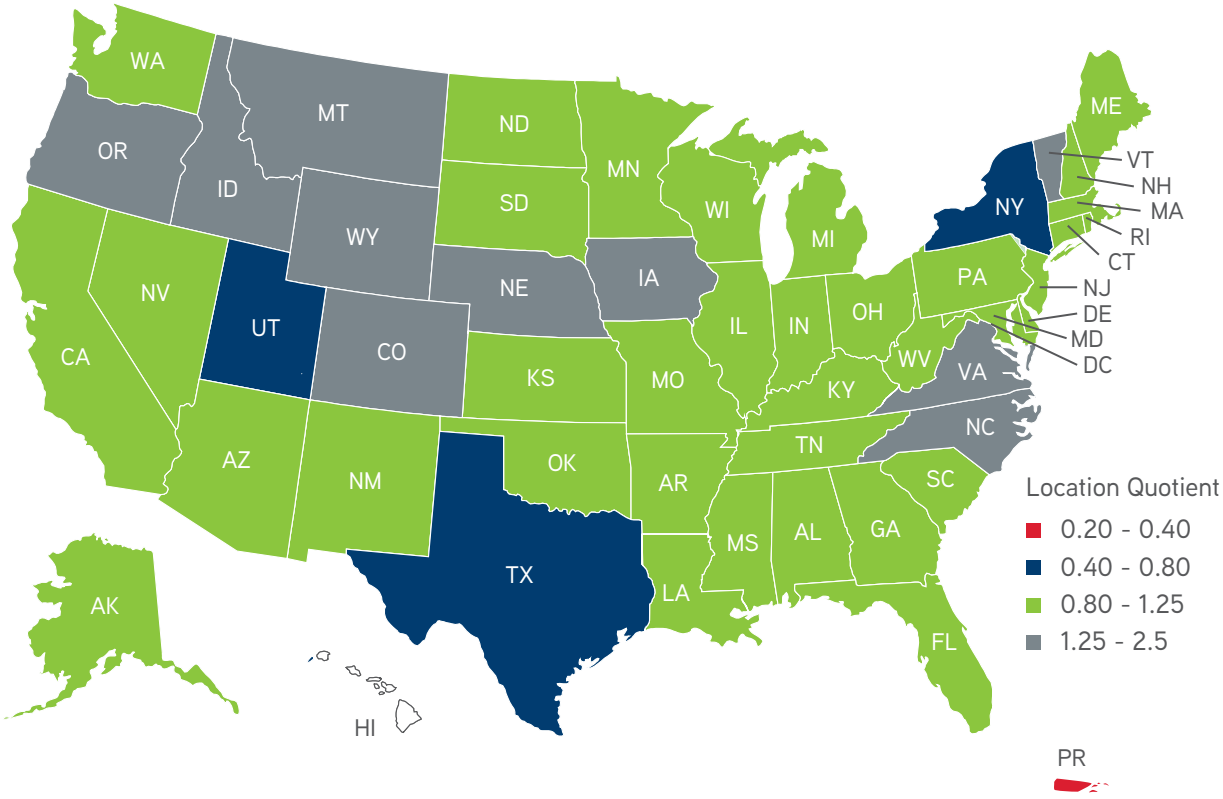



Figure 43

AVMA maintains a database of all U.S. veterinarians who have graduated from a U.S.-accredited college of veterinary medicine, and any veterinarian who graduated from a non-U.S.-accredited college and at has become an AVMA member. Using this database of roughly 107,000 active veterinarians in the U.S., a location quotient was computed for each state and is described below. Texas and Utah still have a concentration of veterinarians below the national average but are joined by five additional states including the highly populated state of California. The number of states with a higher concentration of veterinarians than the national average has grown to 14, with Idaho, North Carolina and Virginia no longer in the higher concentration category, and the states of Arkansas, Kansas, Minnesota, Missouri, Oklahoma, Wisconsin and South Dakota joining the seven states identified in the BLS location quotient as highly concentrated.

**LOCATION QUOTIENT OF AVMA VETERINARIANS BY STATE, 2016**

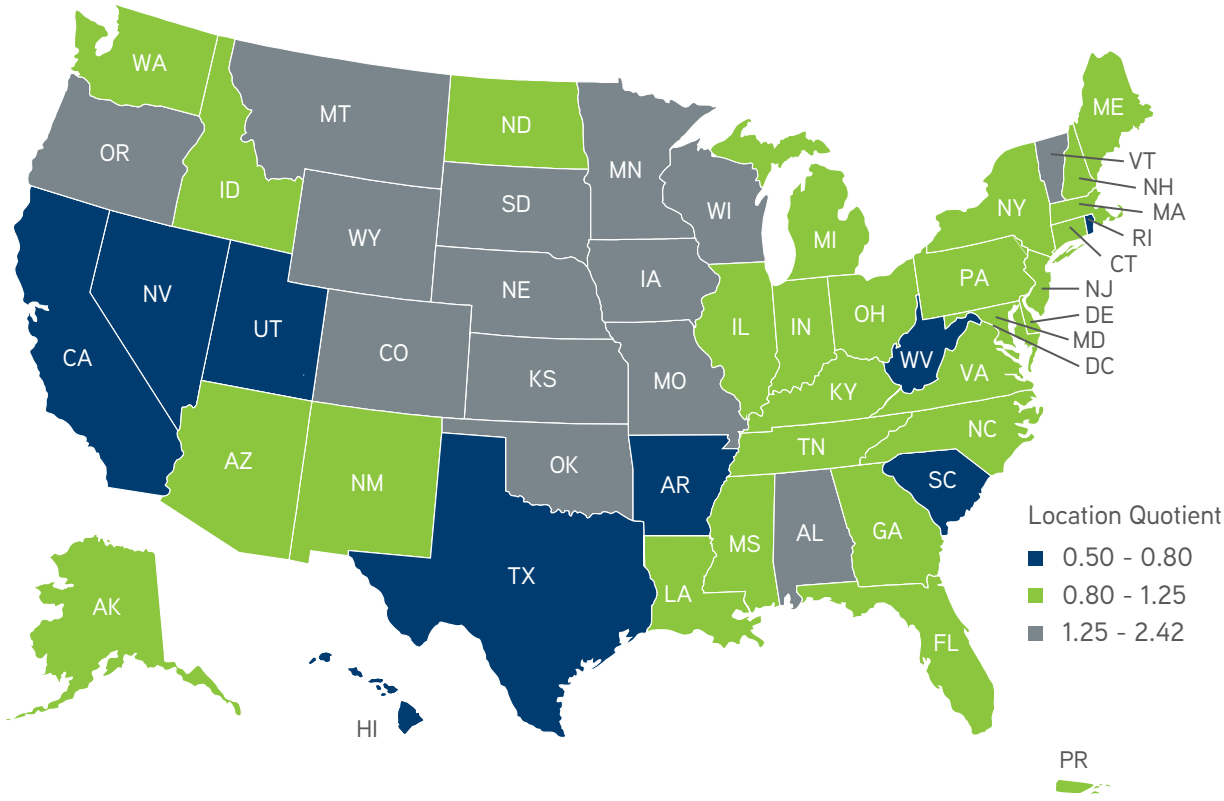



Figure 44

In 2016, roughly 4,400 applicants passed the North American Veterinary Licensing Exam and located in the United States and elsewhere. The location quotient was calculated for these new veterinarians and mapped by state. The pattern is similar to the pattern found in the map of the location quotient for all veterinarians. The concentration of these new veterinarians in Alaska, California, Florida, Maine, Michigan, North Dakota, Pennsylvania and South Carolina, however, was well below the national concentration. For states such as Californian and South Carolina, where the location quotient for the profession is less than one, that the location quotient for new graduates is also less than one suggests an increasing scarcity of veterinarians. These two states should see higher incomes relative to their costs of living, lower unemployment and more negative underemployment.

**LOCATION QUOTIENT OF NEW VETERINARIANS BY STATE, 2016**

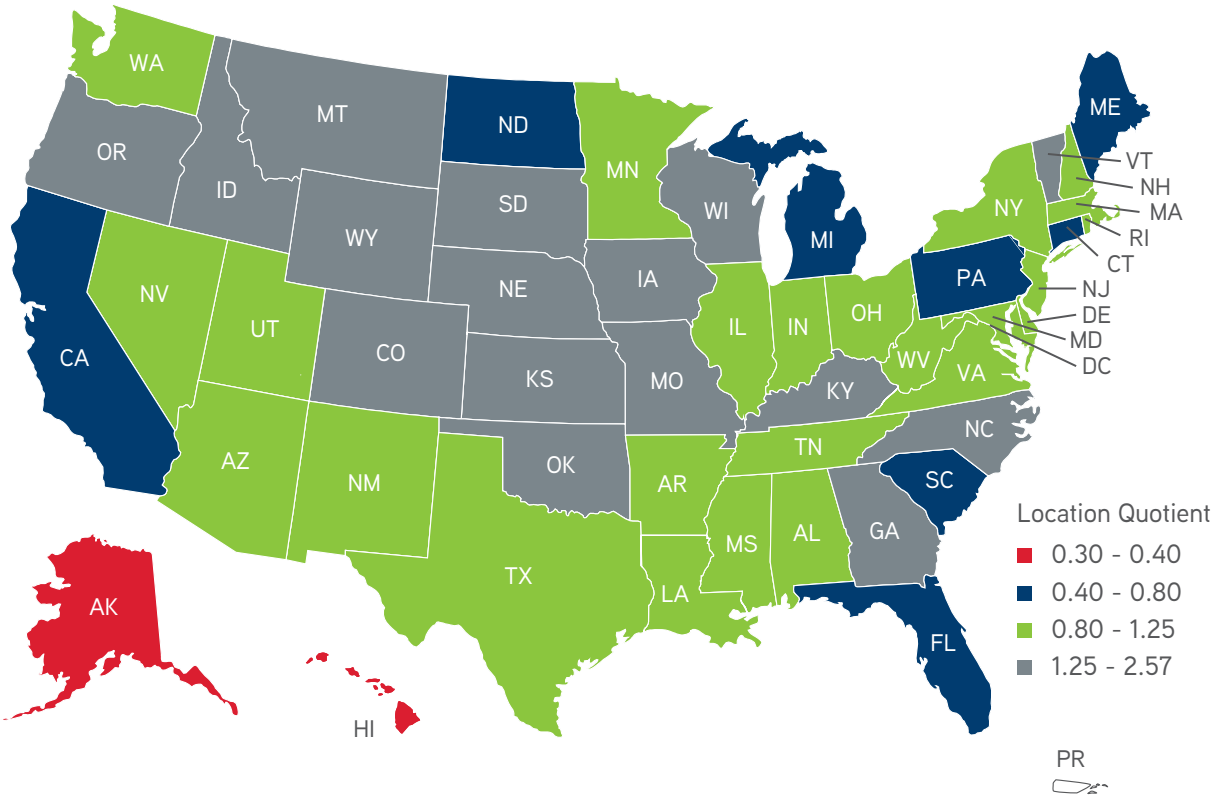


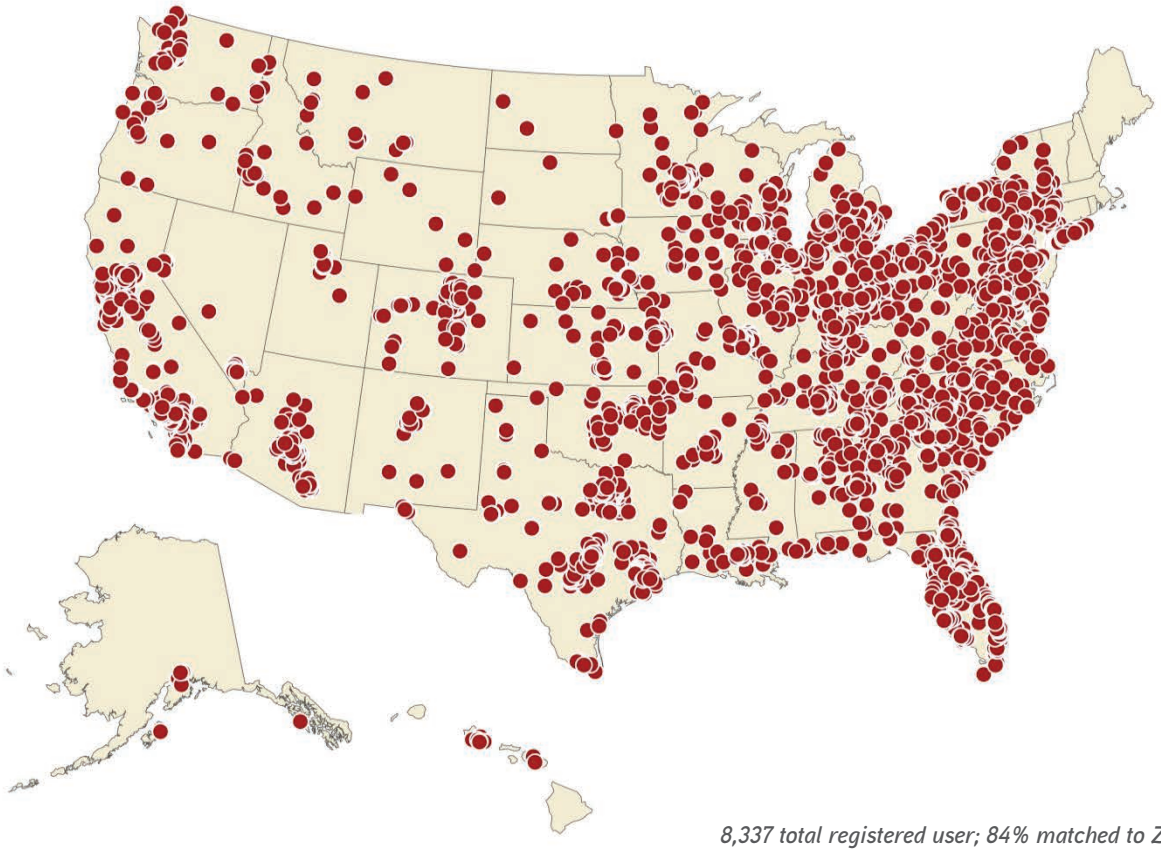

Figure 45

## Distribution of Veterinary Jobs and Applicants

Using the labor quotient provides an overview of the supply and demand for veterinarians at the state level, but veterinary hospitals comprise nearly 70 percent of employment opportunities and the markets (business areas) for most of these hospitals is less than 10 miles (area where 90 percent of clients reside). Thus, the state location quotient may not be adequate in identifying the problem of maldistribution that occurs within smaller areas of states.

Using the VCC data, the location of the applicants and the employment opportunity can be mapped to identify "hot" areas for employment (small numbers of applicants per employment opportunity) and cold areas (large number of applicants per employment opportunity). The map below posts the location (one dot for one applicant) for 8,337 total numbers of registered users of VCC (applicants) who provided their ZIP code information. The distribution is strongly concentrated in the eastern United States.

**VCC REGISTERED USERS, 2016**

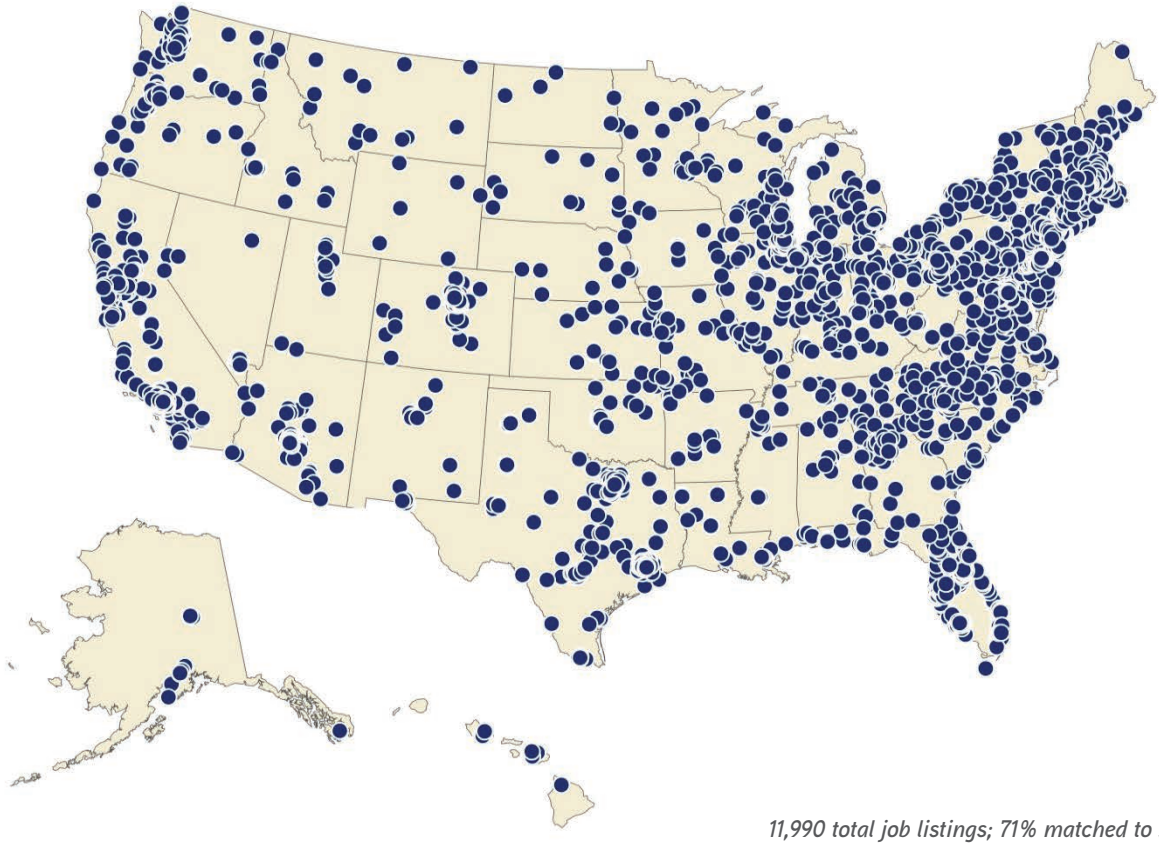


*8,337 total registered user; 84% matched to ZIP code*

Figure 46

The VCC job listings for 2106 appear to be similar to the distribution of registered users but appear much more concentration in the eastern third of the United States.

**VCC DVM JOB LISTINGS, 2016**



*11,990 total job listings; 71% matched to ZIP code*

Figure 47

To help focus attention on the areas that have "hot" and "cold" labor markets, a state-level S/D map can be created by the using the VCC data. The darker shaded states are areas where the number of applicants to employment opportunities is very high, with Alabama and Mississippi having 2.51-4.15 applicants per employment opportunity. The Southwest has the lowest number of applicants per employment opportunities with 0.12-0.5 applicants per employment opportunity.

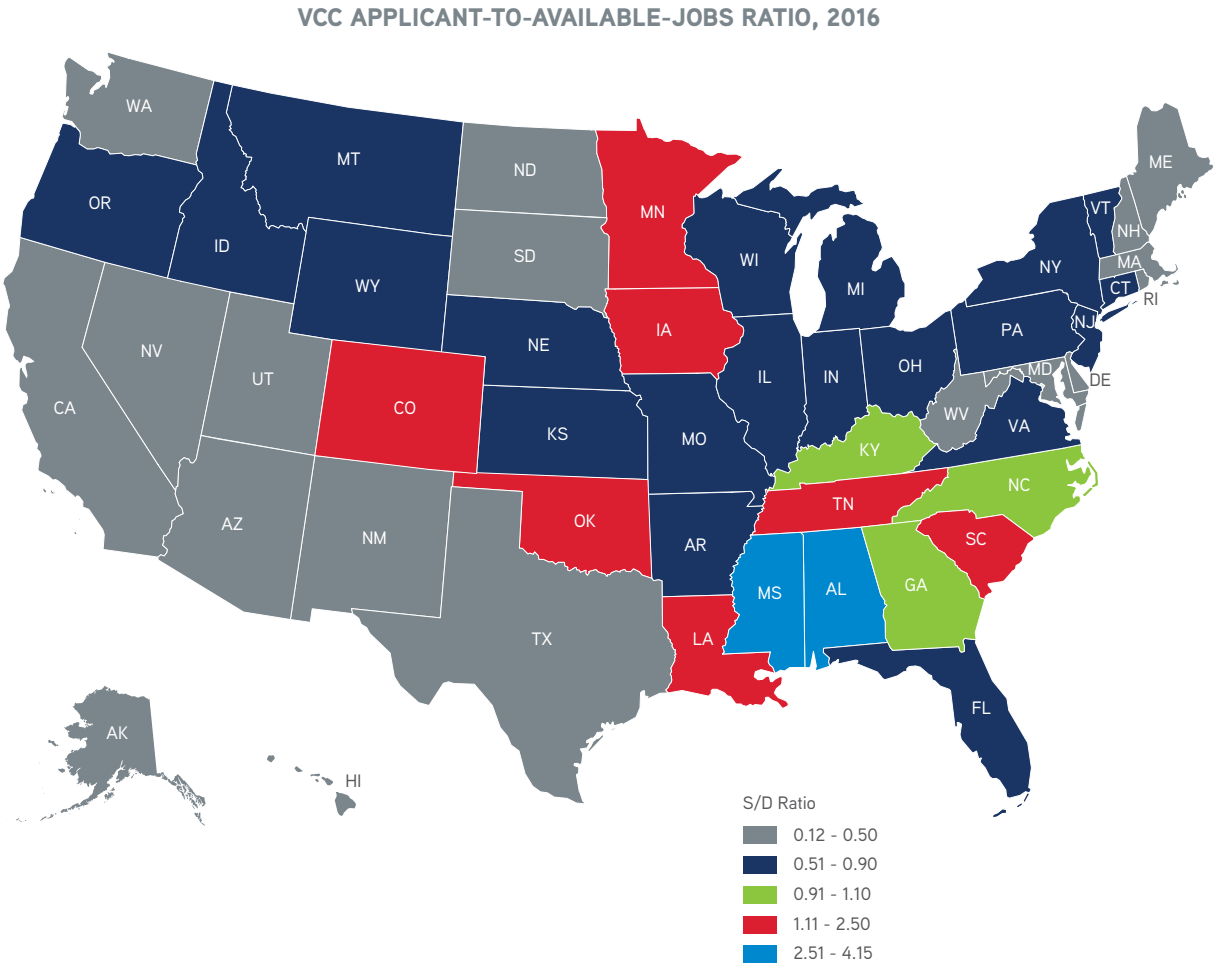



Figure 48

Using the dot map to plot the job applicants per DVM job listing provides a clearer illustration of the localized veterinary labor markets. The larger the blue circle the more applicants that exist per job listing. These large blue areas represent potential "cold" spots for veterinary labor. Competition for each available employment opportunity in these areas is stiff and this is likely to hold down income growth in these areas. The urban centers of Atlanta, Charleston, Dallas, Denver, Houston, Phoenix, Portland and Seattle have applicant-to-job ratios in excess of 10 to one.

**VCC JOB APPLICANT QUANTITY PER DVM JOB LISTING, 2016**

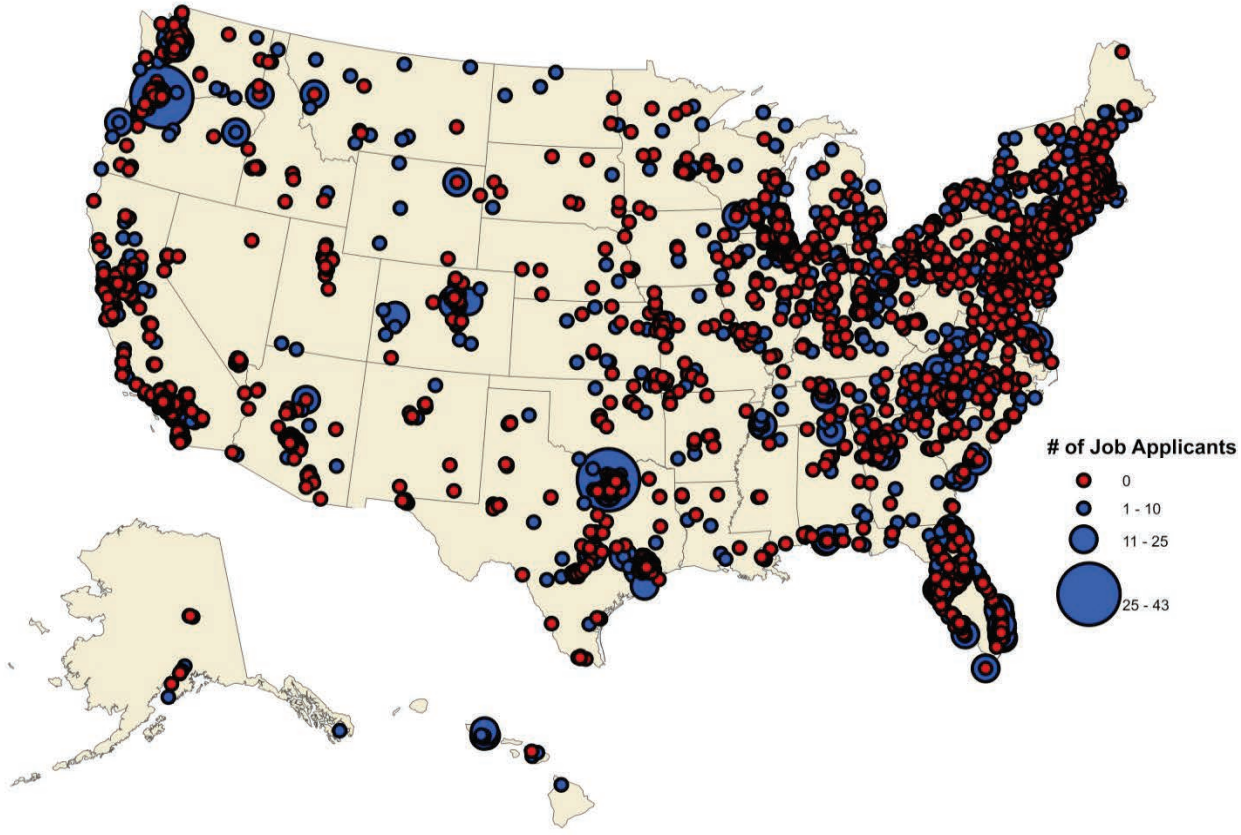



Figure 49

One contributing factor to the problem of maldistribution in the profession is community background of the veterinarians. New veterinarians seek employment in communities similar to those where they grew up. While the U.S. Census has no definition (nor statistics) for suburban communities, most people have an idea of the suburbs. However, the idea of what a suburb is varies considerably. Communities that surround urban centers is the most common perception of a suburb but some who live in communities of more than 10,000 people within proximity of an urban center, but not attached to it, may consider themselves suburban or rural.

**NEW VETERINARIAN COMMUNITY**

| 2013 - 2016 | Grew Up | Found Employment | | | |
|---|---|---|---|---|---|
| | | Rural | Suburb | Urban | Total |
| | Rural | 757 | 320 | 140 | 1,217 |
| | Suburban | 1,164 | 3,804 | 842 | 5,810 |
| | Urban | 480 | 994 | 1,674 | 3,148 |
| | **Total** | **2,401** | **5,118** | **2,656** | **10,175** |

| 2016 | Grew Up | Found Employment | | | |
|---|---|---|---|---|---|
| | | Rural | Suburb | Urban | Total |
| | Rural | 204 | 71 | 38 | 313 |
| | Suburban | 316 | 982 | 210 | 1,508 |
| | Urban | 133 | 258 | 398 | 789 |
| | **Total** | **653** | **1,311** | **646** | **2,610** |

Table 27

**NEW VETERINARIANS SEEK EMPLOYMENT IN COMMUNITIES SIMILAR TO THOSE WHERE THEY GREW UP.**

# VETERINARIAN WELLNESS

**In line with the general population, the level of incurred debt has generally followed an upward trend...**

In an effort to address the growing concern over the wellness of veterinarians, the AVMA has been collecting data on self-reported wellness of veterinarians. The purpose of this collection has been to attempt to find correlations of wellbeing with employment and demographic characteristics. If, in fact, there is a problem with wellness in the veterinary profession, then it is important to know what factors are contributing to lower levels of wellness.

In addition to self-reported wellness measures, the Professional Quality of Life (ProQoL) Scale questions are included in surveys and compassion satisfaction and compassion fatigue scores calculated for each respondent. Compassion fatigue is reported as "Burnout" scores and "Secondary Traumatic Stress" scores and these two scores can be used as dependent variables in measuring the impact of factors that, conceptually, are thought to contribute to either or both burnout or secondary traumatic stress.

The structure of this section follows from the data available on the possible causes of negative wellbeing: student debt load, job, career and lifestyle satisfaction, expenditure patterns, burnout scores and self-reported health evaluations.

## STUDENT DEBT LOAD

The literature on debt of practicing veterinarians, while considerable, tends to focus on debt at graduation, since this amount is fairly easy to measure and most graduates are at about the same place in their lives. Less studied is how that debt changes over time according to the experiences of practitioners who have been out of school for some time. Admittedly, the problem of large student loan debts has accelerated in recent years, but there are few studies to show, beyond qualitative and personal stories, how well DVMs are managing their educational debt. The following figures describe the debt at the start of a veterinarians' career and currently for respondents, according to when an individual graduated from veterinary school.

### VETERINARY COLLEGE DEBT BY GRADUATION YEAR, 2016

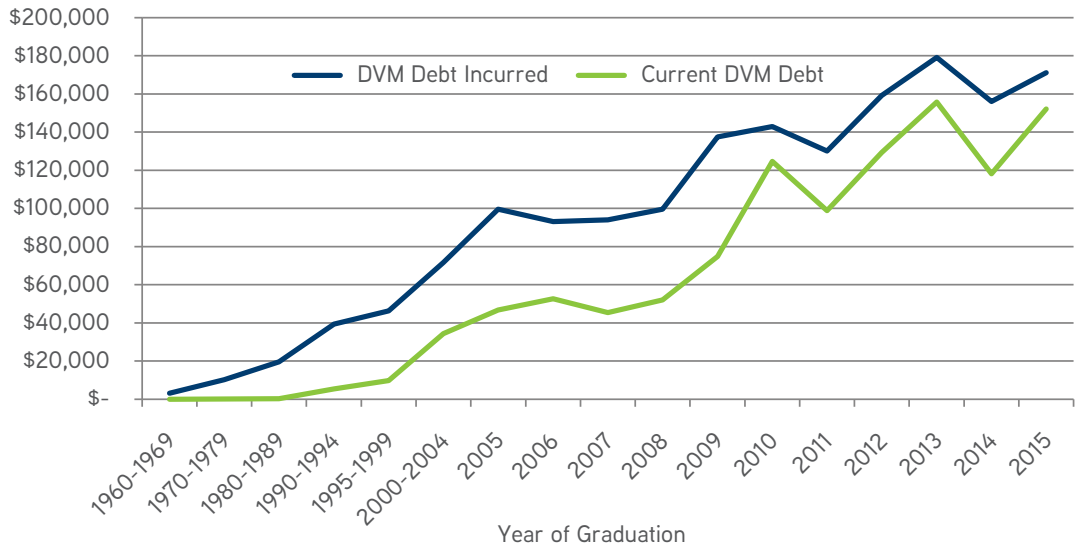



Figure 50

The first figure shows the average debt incurred for each of the sampled graduating classes, with those graduating before 2004 grouped by spans of time. In line with the general population, the level of incurred debt has generally followed an upward trend, with variations most likely due to variation in the respondent sample size in each year. Of those who incurred debt, the current amount owed is less than the original balance. Again, this balance generally rises for those who have graduated at a later date.

The second debt chart shows the dynamics of how that student loan debt has been paid off. Most veterinarians who graduated before 1990 have paid off their student loans and did so in less than 10 years. For those who graduated after 1990, the proportion of borrowers who still owe on their loans increases proportionally according to their year of graduation, with less than 20 percent of those who graduated in 2005 or latter having paid off their loans. As a comparison, those who graduated prior to 1995 and paid off their student loans did so in less than 10 years while for years beyond 1995 fewer veterinarians have been able to pay off their loans in a 10-year period. For those who graduated between 1995 and 1999 only 67 percent paid off their loans in 10 years, for those who graduated between 2000 and 2004 that drops to 41 percent and for those who graduated in 2005, less than 20 percent were able to pay off their loans in 10 years or less.

[4] J. Karl Wise, Center for Information Management, AVMA, 1992

## TIME TAKEN TO REPAY STUDENT LOANS BY GRADUATION YEAR

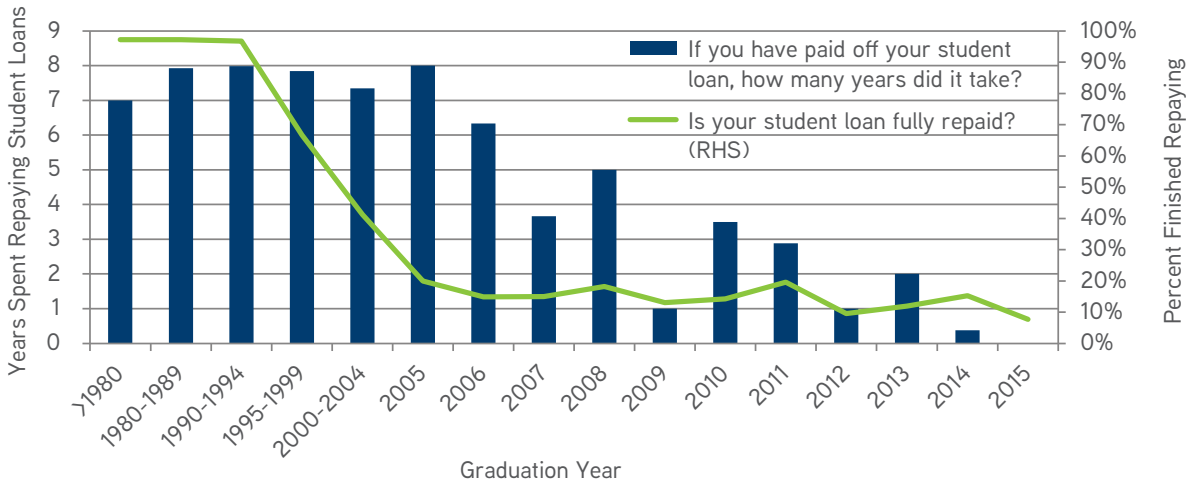
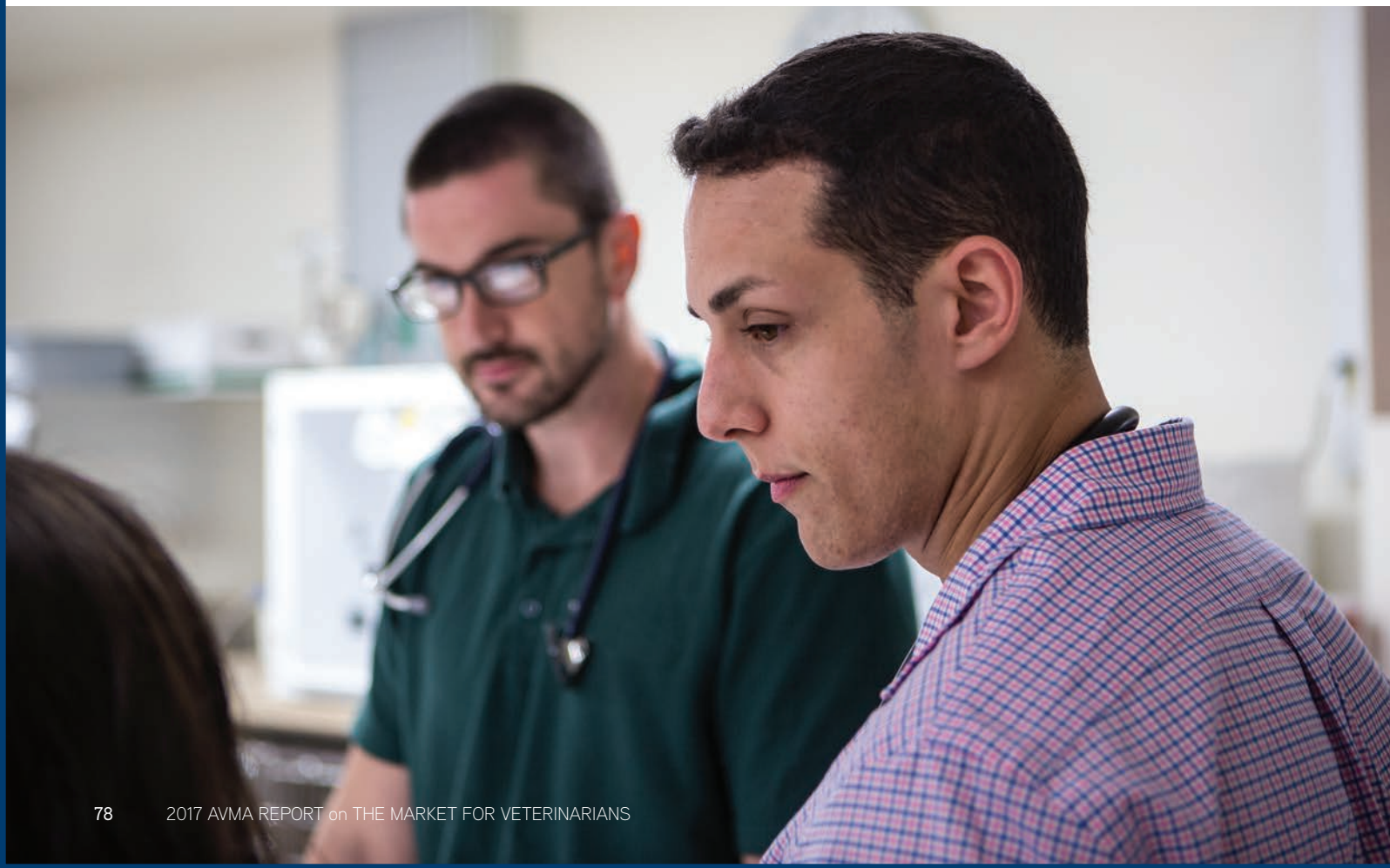



Figure 51



## JOB, CAREER AND LIFESTYLE SATISFACTION

The compensation that a veterinarian receives from an employer should represent the price at which the veterinarian is willing to sell his or her labor and the price at which the employer is willing to pay for that labor. In a perfectly competitive market for veterinarians, the level of compensation conceptually represents an equilibrium point: that level of compensation where the willingness of the veterinarian to sell his or her labor is equal to the willingness of the employer to purchase the same amount of labor. The level of compensation and hours of labor provided is a negotiated amount between the labor provider and the employer. In this case, the hours of labor and total compensation pair represents a point on both the curve of the demand for veterinary labor (veterinarians) and the curve of the supply of veterinary labor. But because the veterinarian is not a homogenous product and each veterinarian can be differentiated by differences in veterinary medical skills, business acumen, client services and individual characteristics, there will be considerable variation in compensation at any point in time.

In terms of supply, the relationship is between the number of hours veterinarians are willing to provide and the compensation required to provide them. The important question to answer pertains to veterinarians' willingness to provide hours of labor at specific levels of compensation. An argument can be made that because of veterinarians' limited ability to use their DVM for other employment opportunities with similar compensation, they are forced to accept employment out of the need to repay the high cost of their education. Thus, the level of compensation does not correctly reflect their willingness to sell their labor for their current level of compensation. That is, it may be that they are taking what they can get but are not satisfied with what they are earning.

To discover veterinarians' willingness to provide the quantity of labor at the level of compensation they currently earn, answers to questions about underemployment can reveal some insight. From the AVMA Employment Survey, it is clear that there were both veterinarians working more hours and fewer hours than they wished. More specifically, some veterinarians indicated they wished to work more hours for more compensation while others indicated they wished to work fewer hours for less compensation. However, this leaves open the question, "Would you like to work fewer hours at the same level of compensation?" and "Would you be willing to work more hours for the same level of compensation?"

The addition of these two questions would close the gap in analyzing the decision process but still would not adequately address the issue of willingness to sell. To address that question specifically requires an understanding of the schedule of number of hours that each veterinarian is willing to work and the compensation at each amount of hours worked.

Unfortunately, obtaining objective information on willingness of the individual veterinarian to sell his or her labor is difficult. Instead, another approach is to measure the level of satisfaction veterinarians report for their current employment and the relationship between that satisfaction and income. If income is an important factor in determining the level of satisfaction, then the relationship between satisfaction and level of income should be both economically and statistically significant. An analysis of the respondents to both the 2015 Employment Survey and the 2015 Compensation Survey found a large and statistically significant relationship between income and job satisfaction.

From the Employment Survey, the relationship between the expressed level of satisfaction on a five-point scale where "1" was "not at all satisfied" and "7" was "very satisfied" is best defined by those whose level of compensation exceeds $100,000. Very few of these higher-income earners indicated they were not satisfied (a 1 or 2 on the five-point scale), while the majority of higher earners indicated they were at least somewhat satisfied (a 3 to 5 on the five-point scale). However, there were low earners (below $60,000) who indicated all levels of satisfaction.

From the 2016 Census of Veterinarians, a distribution of satisfaction was calculated along various income levels. The majority of respondents fell between an annual income of $50,000 and $99,999. Within this group the majority of respondents were neither satisfied nor dissatisfied with their job, giving the median rank of 4 out of 7. Within the group whose income was the highest, above $200,000, the majority of respondents were extremely satisfied with their jobs, selecting a score of 7 out of 7.

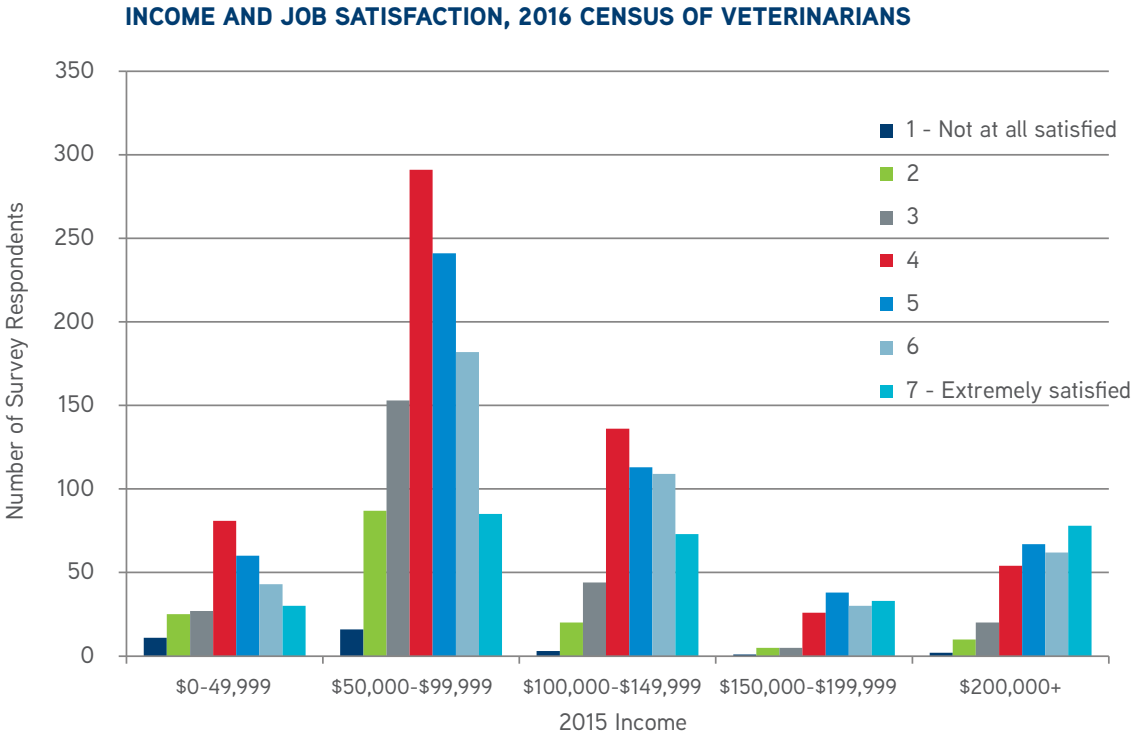



Figure 52

In line with their satisfaction with current employment, respondents indicated a similar pattern in satisfaction with compensation. Approximately 49 percent indicated satisfaction above the central measure (5-7) while 23 percent indicated a greater level of dissatisfaction (1-3) with compensation. Only 6 percent of those who were satisfied with their employment indicated a stronger dissatisfaction with their compensation.

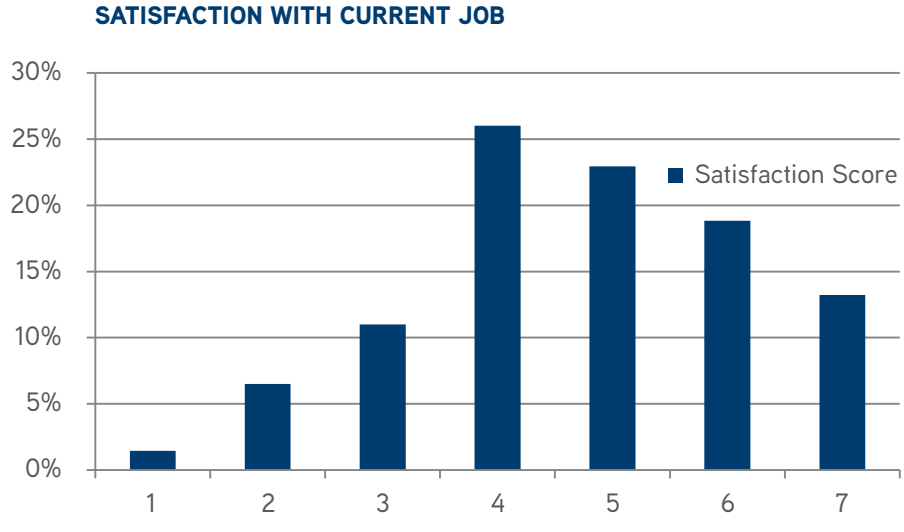



Figure 53

### SATISFACTION WITH COMPENSATION

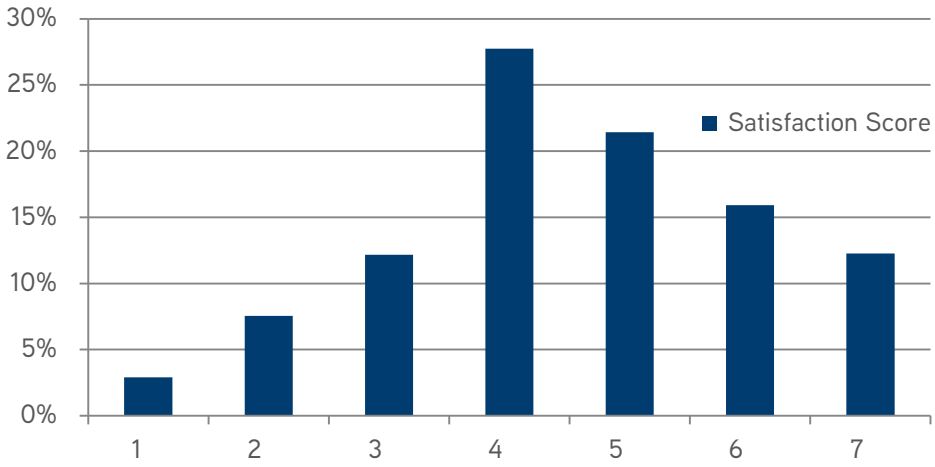



Figure 54

Veterinarians reported that they were less satisfied with their profession than with their current employment or compensation. Only 44 percent indicated satisfaction above the central point (4) while 28 percent indicated satisfaction below the central point.

### SATISFACTION WITH THE VETERINARY PROFESSION

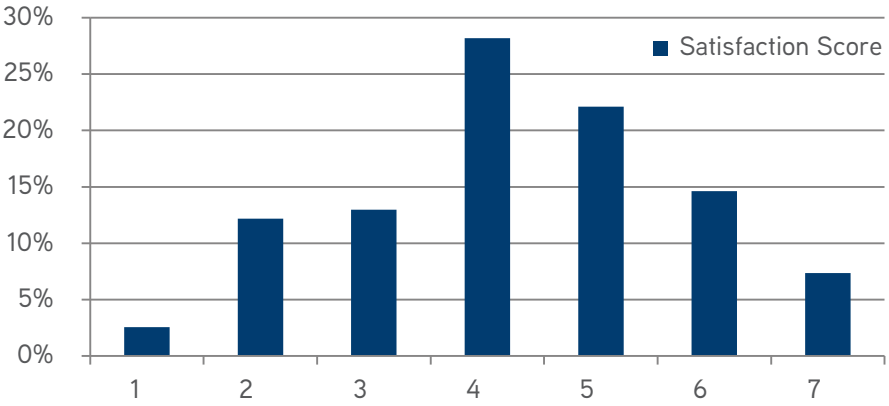



Figure 55

Following closely with the distribution of satisfaction with compensation, 53 percent of respondents indicated a level of satisfaction with their lifestyle above the central level while 21 percent indicated a level of dissatisfaction with their current lifestyle.

### SATISFACTION WITH LIFESTYLE

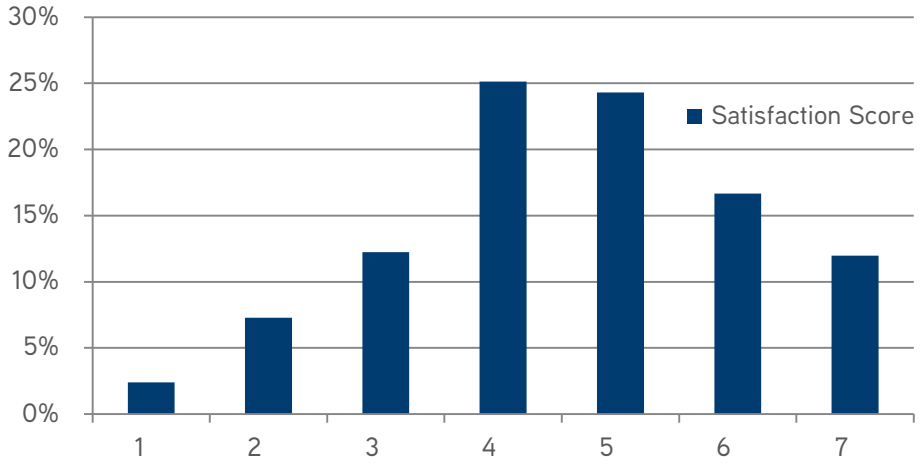



Figure 56

### CORRELATIONS BETWEEN TYPES OF SATISFACTION

| | | How satisfied are you with your current employment? | How satisfied are you with the level of your total compensation? | How satisfied are you with the veterinary profession as a whole? | How satisfied are you with your current job? | How satisfied are you with your current lifestyle? |
|---|---|---|---|---|---|---|
| How satisfied are you with your current employment? | Pearson Correlation | 1 | .502** | .431** | .788** | .532** |
| | Sig. (two-tailed) | | .000 | .000 | 0.000 | .000 |
| | N | 2,819 | 2,811 | 2,797 | 2,800 | 2,800 |
| How satisfied are you with the level of your total compensation? | Pearson Correlation | .502** | 1 | .404** | .624** | .560** |
| | Sig. (two-tailed) | .000 | | .000 | .000 | .000 |
| | N | 2,811 | 2,812 | 2,796 | 2,799 | 2,799 |
| How satisfied are you with the veterinary profession as a whole? | Pearson Correlation | .431** | .404** | 1 | .540** | .476** |
| | Sig. (two-tailed) | .000 | .000 | | .000 | .000 |
| | N | 2,797 | 2,796 | 2,799 | 2,792 | 2,792 |
| How satisfied are you with your current job? | Pearson Correlation | .788** | .624** | .540** | 1 | .652** |
| | Sig. (two-tailed) | 0.000 | .000 | .000 | | 0.000 |
| | N | 2,800 | 2,799 | 2,792 | 2,802 | 2,799 |
| How satisfied are you with your current lifestyle? | Pearson Correlation | .532** | .560** | .476** | .652** | 1 |
| | Sig. (two-tailed) | .000 | .000 | .000 | 0.000 | |
| | N | 2,800 | 2,799 | 2,792 | 2,799 | 2,802 |

**. Correlation is significant at the 0.01 level (two-tailed).

Table 28

The four measures of satisfaction (employment, compensation, profession, lifestyle) illustrated above appear to have similar distributions across levels of satisfaction. To determine how closely respondents replied to each question, a Pearson product-moment correlation matrix was generated for the four measures. The Pearson correlation coefficient is a measure of the linear relationship between two variables. A positive coefficient indicates a positive or direct linear relationship and a negative value indicates a negative or indirect linear relationship. The coefficient value is between 0 and negative or positive 1, the greater the coefficient, the stronger the linear relationship. The level of significance (Sig. 2 tailed) provides a probability that the value of the relationship is 0. For all of the measures the probability that there is not a linear relationship is essentially 0 (.000). A measure of 1 would indicate that the satisfaction measures are perfectly correlated. That is, every respondent who indicated they were extremely satisfied with their employment would also indicate the same level of satisfaction with the correlated measure.

The correlation between each of the measures is strong and statistically significant and this indicates that those who are satisfied with one aspect (employment, compensation, profession and lifestyle) have the same or close level of satisfaction with the other aspects. Thus, these measures of satisfaction suggest a cohort that is dissatisfied with many aspects of their life.

**SATISFACTION WITH EMPLOYMENT AND MEAN INCOME**

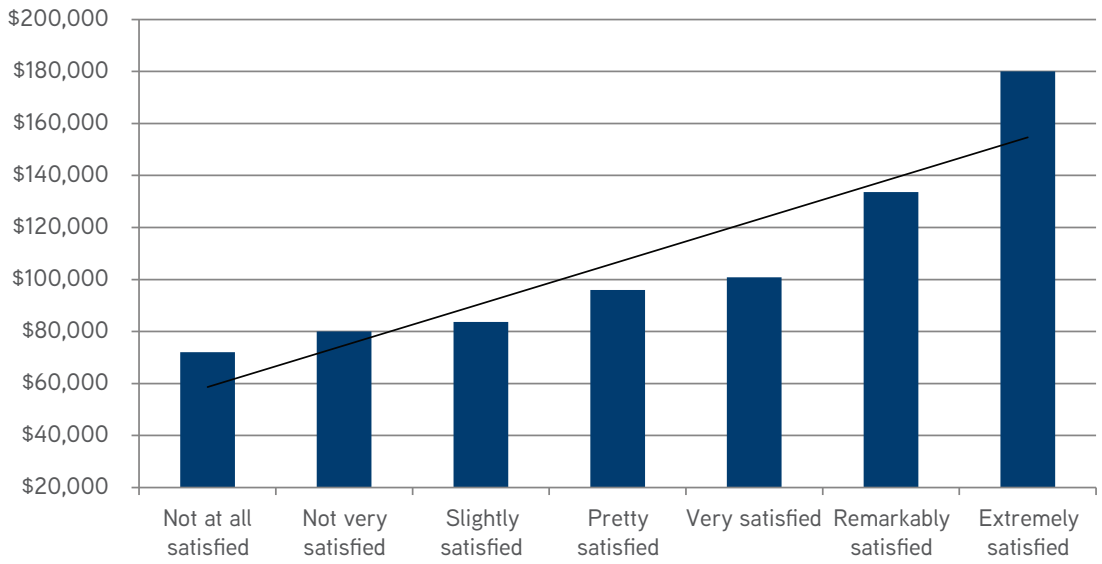



Figure 57

**53%**

**FOLLOWING CLOSELY WITH THE DISTRIBUTION OF SATISFACTION WITH COMPENSATION, 53 PERCENT OF RESPONDENTS INDICATED A LEVEL OF SATISFACTION WITH THEIR LIFESTYLE ABOVE THE CENTRAL LEVEL**

The relationship that exists between level of satisfaction with employment and mean income is statistically significant. On average the mean income at each level of satisfaction is $16,000 greater than the previous, lower level of satisfaction. The biggest difference exists between those who have reported being remarkably satisfied with their job and those reporting being extremely satisfied with their job having respective mean incomes of $134,000 and $180,000.

Of course, many factors contribute to satisfaction with employment, including actual hours worked compared to the number of hours desired, internal relationships, number of clients per day and level of debt. But there is a clear relationship between the level of income and satisfaction. This is important, especially to pre-veterinary and veterinary students and new veterinarians who may harbor the belief that compensation is unimportant as long as they are "doing what they love to do." While these data certainly suggest that this outlook may be true for some, generally this is not the case.

The results are similar in an analysis of 2015 Compensation Survey data. The survey asked the question, "How satisfied are you with your career?" Respondents could answer from 1 (not at all satisfied) to 7 (extremely satisfied). The proportion of respondents who indicate the higher levels of satisfaction (5-7) are noticeably larger in the higher-level income categories, while the proportion of those respondents indicating the lower level of satisfaction (1-3) are larger in the lower income categories.

The seven levels of responses caused a larger range of mean incomes, from a low of $72,087 from those who responded with a 1 (not at all satisfied), to a high of $180,058 from those who responded with a 7 (extremely satisfied). The linear relationship predicts a $16,013 difference between each level of satisfaction. The important point to take away from this is that the patterns of responses and levels of income are consistent across the two datasets, indicating the existence of a very real, measurable pattern: that higher levels of compensation are correlated with higher levels of satisfaction.

Most important is that, generally, veterinarians seem to be satisfied with their career choice with more than 50 percent of respondents indicating that they are at least very satisfied.

Seventy-five percent of respondents claimed to be at least a 4 (pretty satisfied) on the satisfaction scale.

The willingness of veterinarians to provide veterinary service labor, based on this simple analysis, increases as compensation increases. And this analysis suggests that a satisfaction level of 4 would generally require a level of compensation in the range of $95,000-$100,000. In addition, based on previous findings, this level of compensation should occur at the optimum level of hours worked. While the relationship between compensation and number of hours of labor available defines the supply relationship, understanding the factors that affect the willingness of veterinarians to supply labor is important to determining the number of veterinarians needed to meet the demands for veterinary services.

The challenges in estimating the demand for veterinarians are similar to those for estimating the supply. Demand is the relationship between the hours of veterinarian labor and the compensation the employer is willing to pay for those hours. The market demand is the summation of all of the individual employer relationships between hours and level of compensation. As with supply, developing this relationship would require obtaining the willingness-to-pay information from employers.

Our data contain points where the veterinarian and the employer have agreed to a level of compensation and number of hours of labor. For each of these transactions, the employer may have been willing to pay more but was not forced to because the veterinarian accepted less. Or, the veterinarian received a greater level of compensation than he or she was willing to accept in return for the hours of labor required. Under normal market circumstances, the veterinarian would not provide labor for less than the compensation he or she was willing to accept, and the employer of veterinarian labor would not pay more for the labor needed than the employer was willing to pay. An abundance of labor and few opportunities for employment would cause the level of compensation to fall. A scarcity of labor in a market with many employment opportunities would cause the level of compensation to rise for the same amount of labor. Thus, over time, the changes in the level of compensation and the number of veterinarians employed would provide insight into the changing willingness of employers to pay for, and veterinarians to sell, veterinary labor.

In the market for new veterinarians, the compensation and number of veterinarians employed contains 14 aggregate annual observations (supply and demand equilibriums), while in the market for current veterinarians there are currently only eight such equilibrium points. This quantity of points is generally insufficient to estimate the demand relationship.

## PERSONAL EXPENDITURE PATTERNS

In the 2016 calendar year, a sample of 147 recent graduates completed the Personal Financial Planning Tool available on the AVMA website (https://www.avma.org/PracticeManagement/BusinessIssues/Pages/personal-financial-planning-tool.aspx). "Recent graduate" is defined as anyone who graduated between 2011 and 2015, which are the five most recent graduation years.

The expenditures of these early career veterinarians were aggregated by expense category and compared to a similar age group and national income averages for the United States. The average early career veterinarian completing the Personal Financial Planning Tool in 2016 had a mean household income of $96,563 and this falls between the eighth ($90,810) and ninth decile ($120,624) of U.S. households.

### COMPARISON OF MEAN EXPENSES

| | Veterinarian Household, Recent Graduate, 2016 | General Population, 25-34 Years Old, 2015 |
|---|---|---|
| **Demographics** | | |
| Age | 30 | 30 |
| Household Size | 1.5 | 2.7 |
| Home Ownership Rate | 28% | 39% |
| College Education Rate | 100% | 74% |
| Gross Household Income | $96,563 | $64,472 |
| **Expenses** | | |
| Federal and State Taxes | $17,874 | $7,163 |
| Student Loan Payments | $9,219 | n/a* |
| Credit Card Debt Payments | $5,272 | n/a* |
| Housing | $20,129 | $18,305 |
| Transportation | $3,824 | $9,777 |
| Food | $6,295 | $6,636 |
| Healthcare, Insurance and Medicare | $6,147 | $4,767 |
| Professional Development | $985 | $1,123 |
| Recreation and Leisure | $4,514 | $4,039 |
| Savings, Retirement and Social Security | $12,059 | $6,753 |
| Personal and Miscellaneous | $3,415 | $3,752 |
| Child Care** | $598 | n/a* |
| Pet Expenses | $943 | $384 |
| **Annual Expenditures** | $91,274 | $62,699 |

*These categories are not separately recorded in the BLS CE survey.

Sources: AVMA estimates and the Bureau of Labor Statistics Consumer Expenditure Survey

Table 29

There are similarities between the veterinarian and similar-aged general and similar income population households. Recreation and leisure spending is almost identical, though the similar-aged general population spends about a third more of their income on recreation and leisure. Personal and miscellaneous spending is similar for the veterinarian and similar-aged households, but the similar income households spend twice as much. All three groups spend a similar amount on housing, and the veterinarians and similar-aged households spend about the same on food while the similar income households spend 30 percent more.

While the similarities are interesting, the differences are even more so. First, notice that the average household size of 1.5 for recent graduates versus 2.7 for the similar-aged and 2.9 for the similar income households. Furthermore, the home ownership rate in the similar-aged household is 30 percent higher than that of veterinarians while the similar income households is nearly triple. Of course, the similar income households have a mean age of 47 while the veterinarians mean age is 30.

The amount of taxes paid by the similar-aged and similar income households is considerably less than for the veterinary households. This large difference reflects the difference in income, number of people in the household and the effect of the mortgage interest deduction on the tax rate.

The third large difference is in the amount spent on transportation. The similar-aged households spent almost three times more than the veterinary households while the similar income household spent nearly four times as much of a proportion.

The census data do not specifically itemize school loans or credit card debt and thus a comparison cannot be made, but recent graduates pay an average of $9,219 in student loan payments and have an average of $5,272 in credit card payments.

## COMPASSION SATISFACTION AND FATIGUE

Over the last several years, the wellness of veterinarians has become a major concern within the profession. The high rate of suicides among veterinarians compared to other professions has led to a call for action.

Starting in 2015, the ProQoL tool was included in the annual survey of veterinarians (employment survey in 2015, Census of veterinarians in 2016) to begin to understand the factors that may contribute to compassion satisfaction and fatigue.

The ProQoL[2] tool is a measure of compassion satisfaction and compassion fatigue associated with helping others who have experienced suffering. Compassion satisfaction is about the pleasure you derive from your work. For example, you might feel like it is a pleasure to help others through what you do at work. You might feel positively about your colleagues or your ability to contribute to the work setting or even the greater good of society through your work with people who need care. Compassion fatigue encompasses negative feelings derived from work through scoring of burnout (exhaustion, frustration, anger, depression) and secondary traumatic stress (work-related trauma).

Responses to the ProQoL questions are scored based on the responses of thousands of individuals across a number of occupations. The ProQoL survey instrument contains a set of 30 questions and asks respondents to consider each of the questions in the context of "you and your current work situation." A five-point scale is provided (1=never, 5=very often) to reflect honestly how frequently over the last 30 days the respondent experienced each of the feelings listed. The scores have been established to describe low-, normal- and high-compassion satisfaction and fatigue as well as burnout and secondary trauma. The results from the AVMA surveys indicated that the mean ProQoL scores for compassion satisfaction were in the higher normal range, while compassion fatigue, burnout and secondary trauma were in the lower normal range. But these mean scores fail to illustrate the number of respondents who were in the high range for burnout and secondary trauma. The results of the ProQoL scores are plotted against the percent of respondents with each specific score. The distribution of compassion satisfaction scores follows a normal distribution that is skewed left. Less than a score of 22 is considered a low score for compassion satisfaction.

### COMPASSION SATISFACTION SCORE DISTRIBUTION

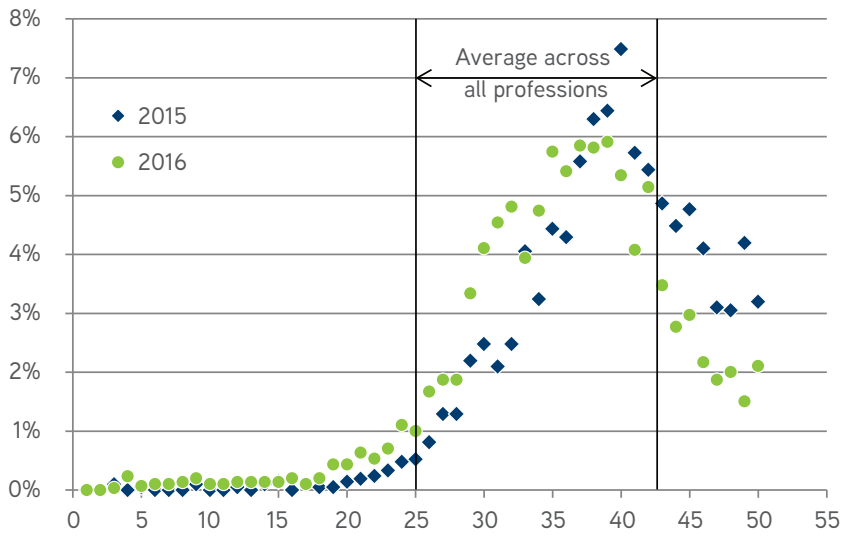



Figure 58

[2] B. Hudnall Stamm, 2009. Professional Quality of Life: Compassion Satisfaction and Fatigue Version 5 (ProQOL). /www.isu.edu/~bhstamm or www.proqol.org

Looking at what factors are associated with low compassion satisfaction, a multiple linear regression was conducted with the variables that were felt might contribute to the variation in compassion satisfaction or compassion fatigue. The result of this analysis indicated that only two factors, satisfaction with current employment and how well the veterinarian felt prepared for his or her career, were statistically significant in both 2015 and 2016. Both of these factors were positively associated with compassion satisfaction.

In 2016, industry employment, lower income and hourly compensation were found to be statistically significant in a negative association with compassion satisfaction, while being employed in academia, living in a smaller community, and increased age were positively associated with compassion satisfaction.

### COMPASSION SATISFACTION SCORE

| | 2016 | | 2015 | |
|---|---|---|---|---|
| | Coefficient | P Value | Coefficient | P Value |
| (Constant) | 16.001 | 0.000 | 18.851 | 0.000 |
| Satisfaction with current employment | 3.016 | 0.000 | 2.753 | 0.000 |
| How well your education has prepared you to be a veterinarian | 1.758 | 0.000 | 1.682 | 0.000 |
| Professor (Assistant, Associate, or Full) | 4.488 | 0.025 | | |
| Industry/commercial organizations | -4.441 | 0.038 | | |
| Advanced Education | | | -1.763 | 0.018 |
| Size of community in which practice is located: 2,500 to 49,999 residents | 0.655 | 0.035 | | |
| Compensation mode: Hourly | -1.162 | 0.026 | | |
| Personal Income | -9.37E-07 | 0.048 | | |
| Gender: Female=1/ Male=0 | | | 1.021 | 0.001 |
| Age | 0.054 | 0.000 | | |
| Hours Worked per week | | | 0.035 | 0.002 |
| Ethnicity – Asian | | | 1.999 | 0.012 |
| Marital Status: Single | | | -0.932 | 0.003 |
| Marital Status: Divorced | | | 1.363 | 0.038 |

Table 30

The two sources of compassion fatigue, burnout and secondary traumatic fatigue, were also measured. A score above 35 on the burnout or secondary trauma stress scale might suggest a need to seek help to deal with the factors that are causing either burnout, secondary trauma stress or both. The burnout scores from both the 2015 and 2016 surveys were normally distributed with the mean at the low end of the normal range. However, 7.2 percent of 2016 respondents had scores in excess of 35.

**BURNOUT SCORE DISTRIBUTION**

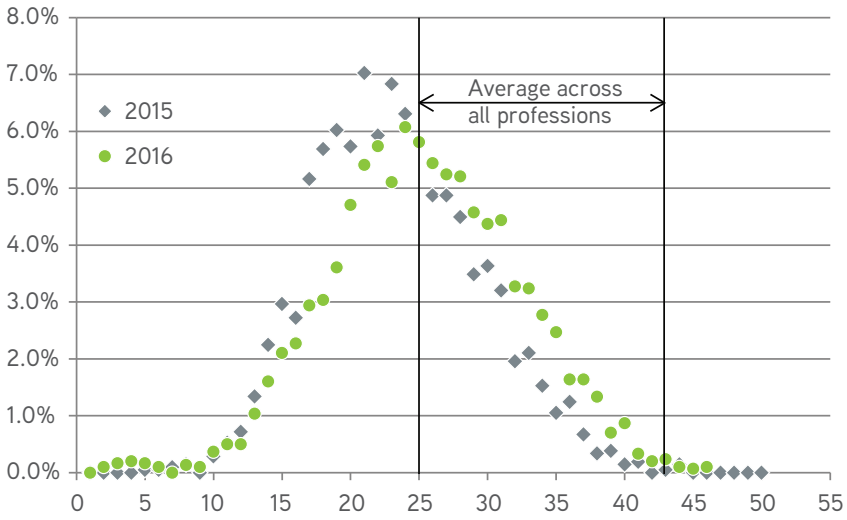



Figure 59

**IN 2016, INDUSTRY EMPLOYMENT, LOWER INCOME AND HOURLY COMPENSATION WERE FOUND TO BE STATISTICALLY SIGNIFICANT IN A NEGATIVE ASSOCIATION WITH COMPASSION SATISFACTION, WHILE BEING EMPLOYED IN ACADEMIA, LIVING IN A SMALLER COMMUNITY, AND INCREASED AGE WERE POSITIVELY ASSOCIATED WITH COMPASSION SATISFACTION.**

Using the same approach to examine the factors associated with burnout that was used with compassion satisfaction, three factors were found to be statistically significant in both 2015 and 2016. The less satisfied with current employment and the less prepared the respondent thought their education had prepared them for a career in veterinary medicine, the greater the burnout score. The more hours worked per week, the greater the burnout score. Again, there were several other factors that were statistically significant in their association with higher levels of burnout.

**BURNOUT SCORE**

| | 2016 | | 2015 | |
|---|---|---|---|---|
| **Dependent Variable: Burnout Scale** | **Coefficient** | **P Value** | **Coefficient** | **P Value** |
| (Constant) | 37.044 | 0.000 | 36.151 | 0.000 |
| Satisfaction with current employment | -2.707 | 0.000 | -2.594 | 0.000 |
| Food animal practice (predominant) | | | -3.891 | 0.000 |
| Food animal practice (exclusive) | | | -3.329 | 0.000 |
| Equine practice | | | -1.657 | 0.008 |
| Not-for-profit organizations | -4.629 | 0.024 | | |
| Hours worked per week | 0.08 | 0.000 | 0.054 | 0.000 |
| How well your education has prepared you to be a veterinarian | -1.055 | 0.000 | -1.188 | 0.000 |
| Gender: Female=1/ Male=0 | 1.04 | 0.002 | | |
| Educational debt | 4.28E-06 | 0.032 | | |
| Ethnicity - Black/African American | -3.385 | 0.038 | | |
| Ethnicity - Hispanic/Latino | | | -2.79 | 0.001 |
| Ethnicity – Asian | | | -1.894 | 0.009 |
| Marital status: Single | | | 1.02 | 0.000 |
| Age | -0.051 | 0.001 | | |
| Graduation Year | | | -0.382 | 0.038 |

Table 31

Secondary traumatic stress scores had a similar distribution to that of the burnout scores. However, the mean is to the left (lower) than for burnout and the percent of respondents with a score above 35 (4.1 percent) is lower than for burnout.

### SECONDARY TRAUMATIC STRESS SCORE DISTRIBUTION

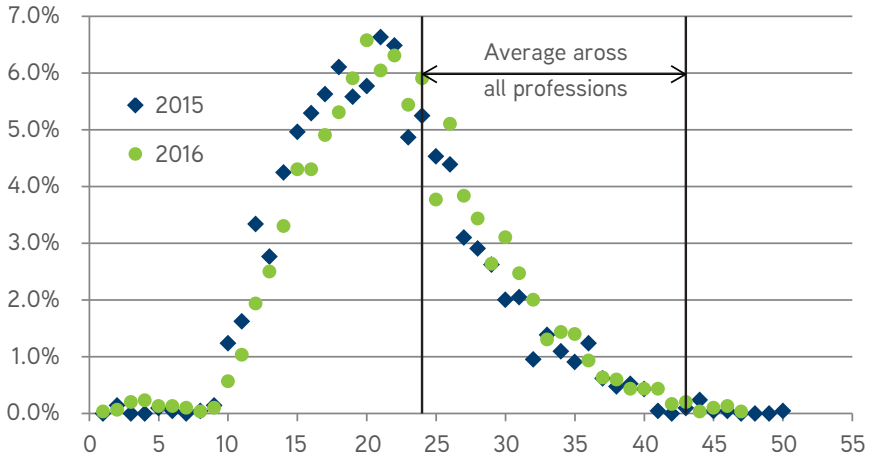



Figure 60

Again, using the same approach to examine the factors associated with secondary traumatic stress that was used with compassion satisfaction and burnout, four factors were found to be statistically significant in both 2015 and 2016. The less satisfied with current employment and the less prepared the respondent felt their education had prepared them for a career in veterinary medicine the greater the secondary traumatic stress score. Females, and the more hours worked per week were associated with greater levels of secondary traumatic stress. As with both compassion satisfaction and burnout, there were several other factors that were statistically significant in their association with higher levels of burnout.

### SECONDARY TRAUMATIC STRESS SCORE

| | 2016 | | 2015 | |
|---|---|---|---|---|
| | Coefficient | P Value | Coefficient | P Value |
| (Constant) | 26.383 | 0 | 23.237 | 0 |
| Graduation year | -0.749 | 0 | | |
| Satisfaction with current employment | -1.349 | 0 | -1.31 | 0 |
| Hours worked per week | 0.075 | 0 | 0.072 | 0 |
| Gender: Female=1/ Male=0 | 1.461 | 0 | 1.883 | 0 |
| How well your education has prepared you to be a veterinarian | -0.581 | 0.009 | -0.695 | 0.001 |
| Food animal practice (predominant) | | | -3.251 | 0.014 |
| Food animal practice (exclusive) | | | -2.732 | 0.017 |
| Companion animal practice (exclusive) | | | 1.724 | 0 |
| Companion animal practice (predominant) | | | 1.278 | 0.015 |
| State/local government | | | -3.817 | 0.015 |
| Uniformed services | 12.997 | 0.032 | | |
| Researcher | 12.11 | 0.005 | | |
| Ethnicity - Black/African American | | | -3.427 | 0.032 |
| Age | | | -0.037 | 0.033 |

Table 32

Burnout score also varies across graduation year. Those graduating within the last 10 years on average have the highest burnout scores, with a mean of 27.4. The scores decrease over the years with those graduating between 1946 and 1955 reporting a mean burnout score of 15.8.

## BURNOUT SCORE AND GRADUATION YEAR

| Graduation year | Mean | N | Std. Deviation |
|---|---|---|---|
| 2006-2015 | 27.3624 | 1,250 | 6.39072 |
| 1996-2005 | 26.1980 | 702 | 6.90691 |
| 1986-1995 | 23.9641 | 473 | 6.38629 |
| 1976-1985 | 22.1025 | 283 | 5.75444 |
| 1966-1975 | 19.6647 | 167 | 5.27053 |
| 1956-1965 | 18.1538 | 65 | 4.91881 |
| 1946-1955 | 15.7778 | 9 | 6.62906 |
| Total | 25.3611 | 2,949 | 6.85675 |

Table 33

Those who are board certified reported a mean burnout score of 24.2 versus the mean burnout score of those not board certified, 25.6.

## BURNOUT SCORE AND BOARD CERTIFICATION

| | Mean | N | Std. Deviation |
|---|---|---|---|
| Not board certified | 25.5946 | 2,526 | 6.78347 |
| Board certified | 24.2151 | 465 | 7.07236 |
| Total | 25.3801 | 2,991 | 6.84625 |

Table 34

The burnout scores between regions ranged from 23 to 28 with Region 0 having the lowest burnout score and Region 9 having the highest burnout score within the United States, at 26.8.

## BURNOUT SCORE AND WORKPLACE LOCATION

| Region of Workplace | Mean | N | Std. Deviation |
|---|---|---|---|
| Region 0 | 23.4686 | 542 | 7.87013 |
| Region 1 | 26.5220 | 182 | 6.56687 |
| Region 2 | 25.9470 | 264 | 6.81177 |
| Region 3 | 26.2724 | 257 | 6.37161 |
| Region 4 | 26.1268 | 205 | 6.60463 |
| Region 5 | 26.3750 | 152 | 5.60725 |
| Region 6 | 25.9337 | 196 | 6.05282 |
| Region 7 | 24.5805 | 503 | 6.44537 |
| Region 8 | 25.9176 | 364 | 6.29214 |
| Region 9 | 26.7869 | 291 | 6.49795 |
| Outside of US | 28.0000 | 24 | 6.10773 |
| Total | 25.4570 | 2,980 | 6.78177 |

Table 35

Additionally, respondents with an income range exceeding $150,000 reported the lowest burnout score of 23.46 and those within the income range of $50,000-$99,999 reported a mean burnout score of 26.86, the highest within the income ranges.

## BURNOUT SCORE AND INCOME RANGE

| Income Range | Mean | N | Std. Deviation |
|---|---|---|---|
| $0 - $49,999 | 23.7752 | 743 | 7.27543 |
| $50,000 - $99,999 | 26.8585 | 1,166 | 6.26795 |
| $100,000 - $149,999 | 26.0843 | 617 | 6.66421 |
| $150,000 - $199,999 | 23.4555 | 191 | 6.72754 |
| $200,000 + | 23.4599 | 274 | 6.66742 |
| Total | 25.4042 | 2,991 | 6.83348 |

Table 36

Females also had a significantly higher burnout score, 26.7 as compared to male respondents, who reported a mean score of 23.4.

## BURNOUT SCORE AND GENDER

| | Mean | N | Std. Deviation |
|---|---|---|---|
| Male | 23.4283 | 1,011 | 6.63217 |
| Female | 26.7435 | 1,926 | 6.35836 |
| Total | 25.6023 | 2,937 | 6.64232 |

Table 37

Also, understandably, burnout score increases with debt levels. Respondents with less than $10,000 of DVM debt have a mean burnout score of 23.8 while respondents whose debt levels range within $200,000 and $249,999 report a mean burnout score of 29.2.

## BURNOUT SCORE AND CURRENT DVM DEBT

| | Mean | N | Std. Deviation |
|---|---|---|---|
| $0 - $9,999 | 23.8473 | 1,683 | 6.65588 |
| $10,000 - $19,999 | 25.4576 | 59 | 7.23336 |
| $20,000 - $29,999 | 25.7377 | 61 | 6.06053 |
| $30,000 - $39,999 | 27.1452 | 62 | 6.67230 |
| $40,000 - $49,999 | 26.0159 | 63 | 5.96898 |
| $50,000 - $59,999 | 26.7385 | 65 | 6.64567 |
| $60,000 - $69,999 | 26.8481 | 79 | 7.22902 |
| $70,000 - $79,999 | 28.0000 | 58 | 6.54539 |
| $80,000 - $89,000 | 26.7885 | 52 | 6.20037 |
| $90,000 - $99,999 | 26.8571 | 63 | 5.51788 |
| $100,000 - $124,999 | 27.1984 | 126 | 6.92592 |
| $125,000 - $149,999 | 27.1261 | 111 | 6.30457 |
| $150,000 - $174,999 | 27.7253 | 91 | 6.49455 |
| $175,000 - $199,999 | 28.9574 | 94 | 6.59246 |
| $200,000- $249,999 | 29.1754 | 114 | 6.12877 |
| $250,000 + | 28.0383 | 209 | 6.41576 |
| Total | 25.4067 | 2,990 | 6.83328 |

Table 38

Burnout scores vary across practice types. Veterinarians reporting employment in the Federal government had the lowest burnout score at 23.25 and those reporting employment in not-for-profit organizations reported the highest burnout score of 26.7, surpassed only by those in advanced education, including internships and residencies, who reported a mean burnout score of 27.5.

### BURNOUT SCORE AND PRACTICE TYPE

| | Mean | N | Std. Deviation |
|---|---|---|---|
| Food Animal Practice (Exclusive) | 23.8065 | 31 | 6.16127 |
| Food Animal Practice (Predominant) | 25.2917 | 24 | 6.01071 |
| Mixed Practice (At Least 25% Companion and 25% Food or Equine) | 26.3034 | 145 | 6.20408 |
| Companion Animal Practice (Predominant) | 25.6319 | 288 | 6.57389 |
| Companion Animal Practice (Exclusive) | 26.2691 | 1,442 | 6.63103 |
| Equine Practice | 26.5169 | 89 | 6.29414 |
| Federal Government (Civil Service) | 23.2542 | 59 | 7.36158 |
| Uniformed Services | 25.7333 | 15 | 7.43031 |
| College Or University (Faculty or Staff Only) | 24.6983 | 242 | 6.34387 |
| State/Local Government | 26.1053 | 38 | 6.96241 |
| Industry/Commercial Organizations | 23.8462 | 78 | 7.23282 |
| Not-for-profit Organizations | 26.7051 | 78 | 6.40233 |
| Advanced Education (Inclusive Of Internships And Residencies) | 27.4545 | 66 | 6.82345 |
| Other Veterinary Employment (Please Specify): | 23.7935 | 92 | 6.44766 |
| Non-Veterinary Employment (Please Specify): | 23.2857 | 14 | 7.03211 |
| Total | 25.8341 | 2,701 | 6.63949 |

Table 39

**THE OVERALL HEALTH OF RETIRED AND UNEMPLOYED VETERINARIANS IS LOWER THAN FOR EMPLOYED VETERINARIANS; HOWEVER IT WOULD BE PREMATURE TO SAY THAT ONE FACTOR CAUSES THE OTHER.**

## PERSONAL HEALTH ASSESSMENT

The 2016 Census Survey asked respondents to broadly evaluate their own health. Of the Survey's 2,502 respondents who reported being currently employed (2,227), 26 percent of those working full time and 23 percent of those working part time, 46 percent of both reported very good health; roughly 23 percent of both reported good health; and 5 percent of full-time veterinarians and 10 percent of veterinarians working part time reported fair to poor health. These contrast with the health of 87 currently unemployed and 152 retired veterinarians (16 percent and 20 percent) who report being in excellent health; 43 percent of both were in very good health, 28 percent and 23 percent were in good health; and 12 percent and 15 percent were in fair health or poor health. The overall health of retired and unemployed veterinarians is lower than for employed veterinarians; however it would be premature to say that one factor causes the other.

**SELF-REPORTED HEALTH BY EMPLOYMENT STATUS**

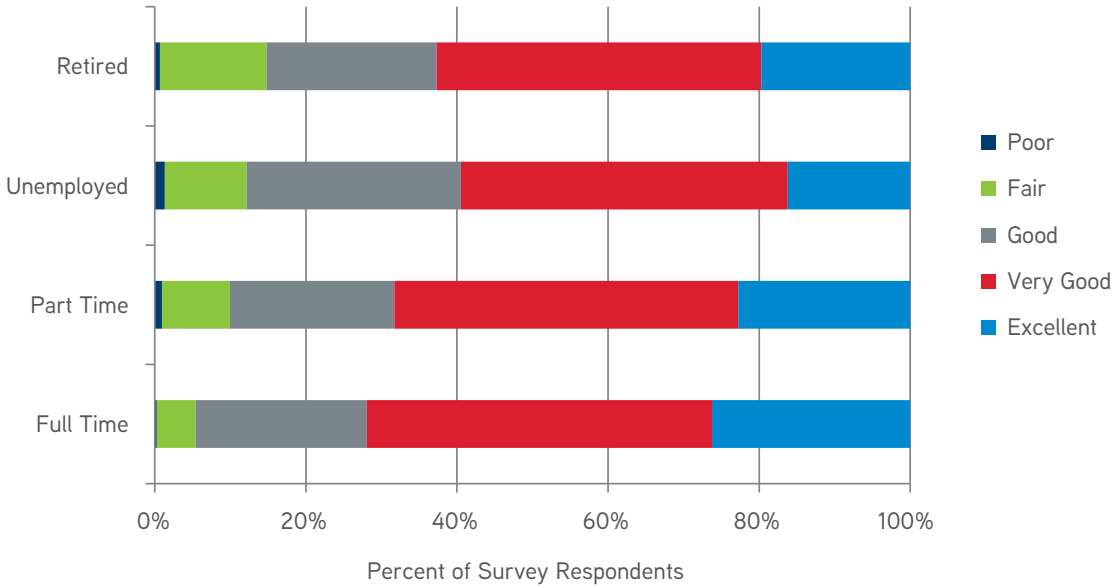



Figure 61

The self-reported health scores also varied by practice type with food animal exclusive veterinarians indicating the largest percentage in excellent health but food animal predominant reporting the largest percentage good to poor health.

Veterinarians in not-for-profit organizations had the lowest percent of respondents indicating excellent health and state and local government veterinarians had the highest percentage of respondents indicating fair or poor health.

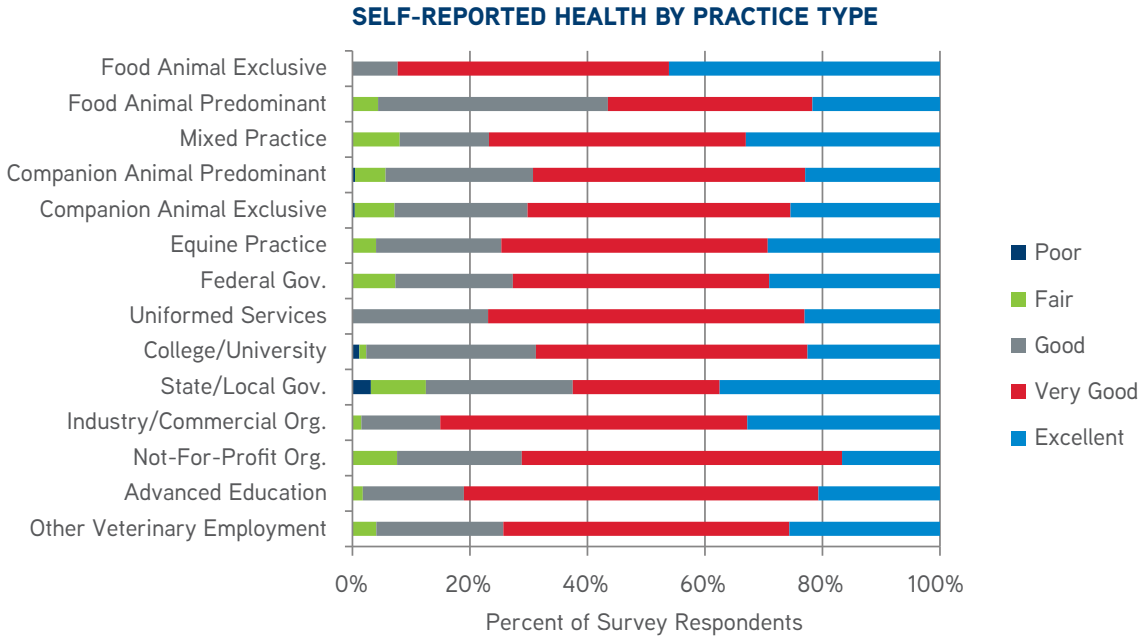



Figure 62

There was little difference in the self-reported health rating by gender with both the mean value and the distribution being very similar.

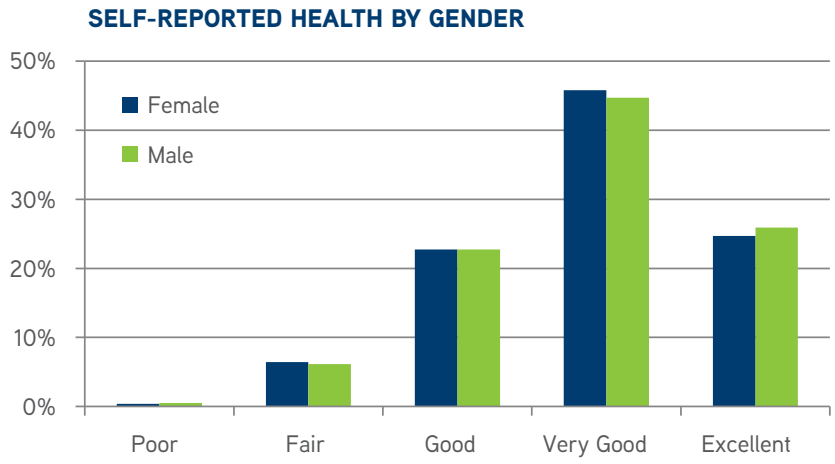



Figure 63

Self-reported health scores also varied little by year of graduation although those who graduated in earlier years had higher percentages of respondents indicating they were in excellent health, just 23 percent of new graduates report excellent health while roughly 34 percent of graduates from 1980 to 1989 reported excellent health.

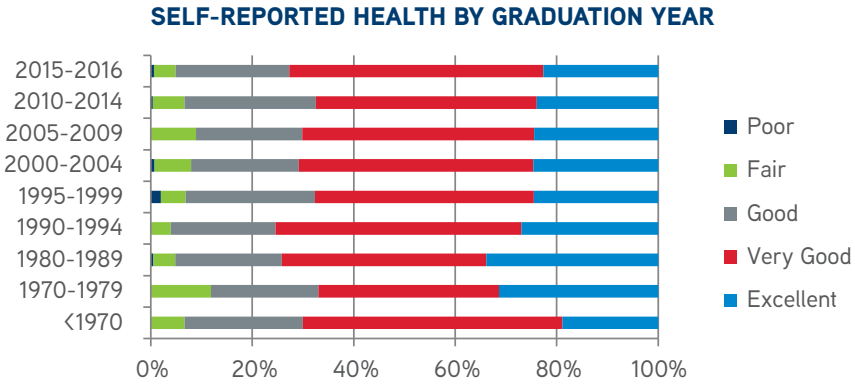



Figure 64

By region, the self-reported health appears to be little different with the Mountain West (Region 8) and the Mid-Atlantic (Region 2) having a slight edge of those reported very good to excellent health.

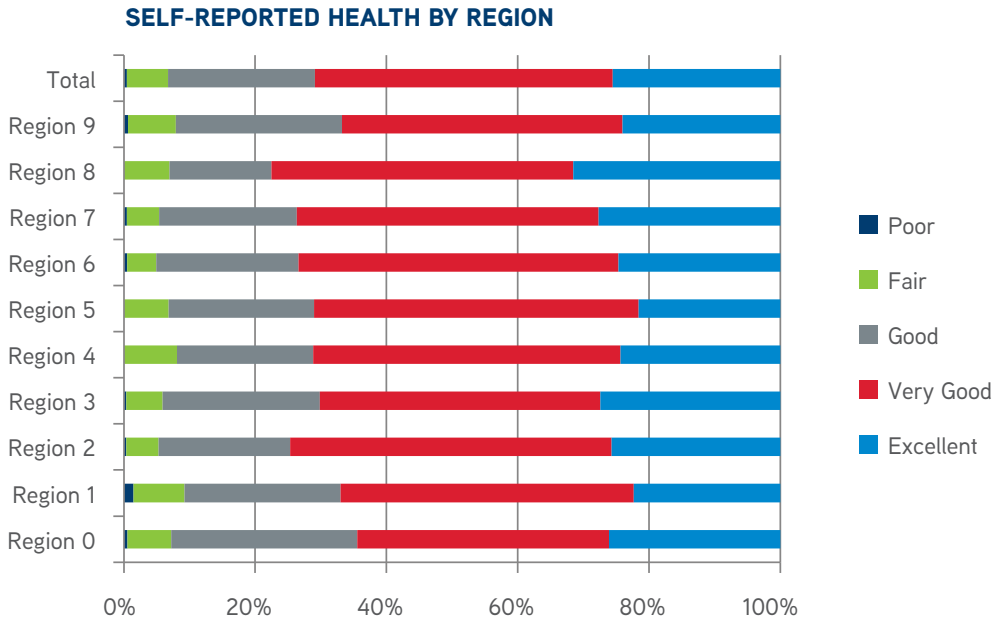



Figure 65

# VETERINARY MARKET KEY PERFORMANCE INDICATOR: NET PRESENT VALUE

**The difference between the returns and the total investment over the lifetime of veterinary work is the net value of the DVM degree.**

The discussion of the veterinary incomes, unemployment, underemployment, applicant-to-jobs ratio and wellness provides an indication of the internal function of the market for veterinarians. The change to each of these measures over time provides an overview of how the market is evolving and the direction the market is headed. But these measures only provide a view of how well the market is functioning internally, not how well the market is performing within the vertically related veterinary markets.

The output of the market for veterinarians is the capacity to provide veterinary services. The performance of this market is the efficiency with which veterinary resources are used to produce veterinary services that are valued by society at or above the cost of producing them, and, one of the main costs is veterinary compensation. An efficient market would enable veterinarians to receive a normal economic return on the cost of becoming a veterinarian. A normal economic return is a percent return on the investment for comparable investments.

Given money to invest, the decision on where to invest is based on how much money can be made by investing in alternative opportunities. The opportunity that provides the greatest return for every dollar invested might be the best investment choice.

Money spent on the DVM degree is an investment and the return is the increased future earnings. Taking a closer look, the DVM degree investment includes three components;

1) actual cost of the education including tuition and fees, books, supplies and equipment needed for the education and any other expenses that were required to obtain the degree;
2) the interest on any money borrowed to pay these education expenses; and
3) income not earned while in veterinary school, an "opportunity cost" that is considered part of the investment.

The value of the investment in veterinary education is the sum of all costs to obtain the DVM: the actual costs to attend veterinary college, the interest on any money borrowed, and the income foregone while in veterinary college and not working.

The returns as noted earlier are the lifelong earnings received as a result of the DVM degree. This is not the total income received as a veterinarian, but the income received that is above what may have been earned with a bachelor's degree. This is the value-added earnings that can be attributed to the DVM degree.

The difference between the returns and the total investment over the lifetime of veterinary work is the net value of the DVM degree. Or, taking the returns as a percent of the total investment provides a measure of the returns on investment.

Because most people prefer current rewards over future rewards, however, the value of an earnings dollar declines each year. This conversion of dollars received or spent in the future to a current value is known as discounting and reflects the social time preference of money. Another way to look at discounting is to ask, "How much would I have to offer to pay you a year from now to not pay you $100 today." If you replied $110, then you have indicated that next year's dollar has to be discounted by 10 percent to be equal to the value of a dollar today.

When both returns and investment are discounted, the net value of the DVM degree becomes the net present value (NPV) of the DVM degree and provides an indication of the value of increased earnings resulting from obtaining the DVM degree in today's dollars. The average NPV of the DVM (VMD) degree for the 2016 graduates was roughly $250,000, but this varies greatly by location, practice type, hours worked, specialization and other factors.

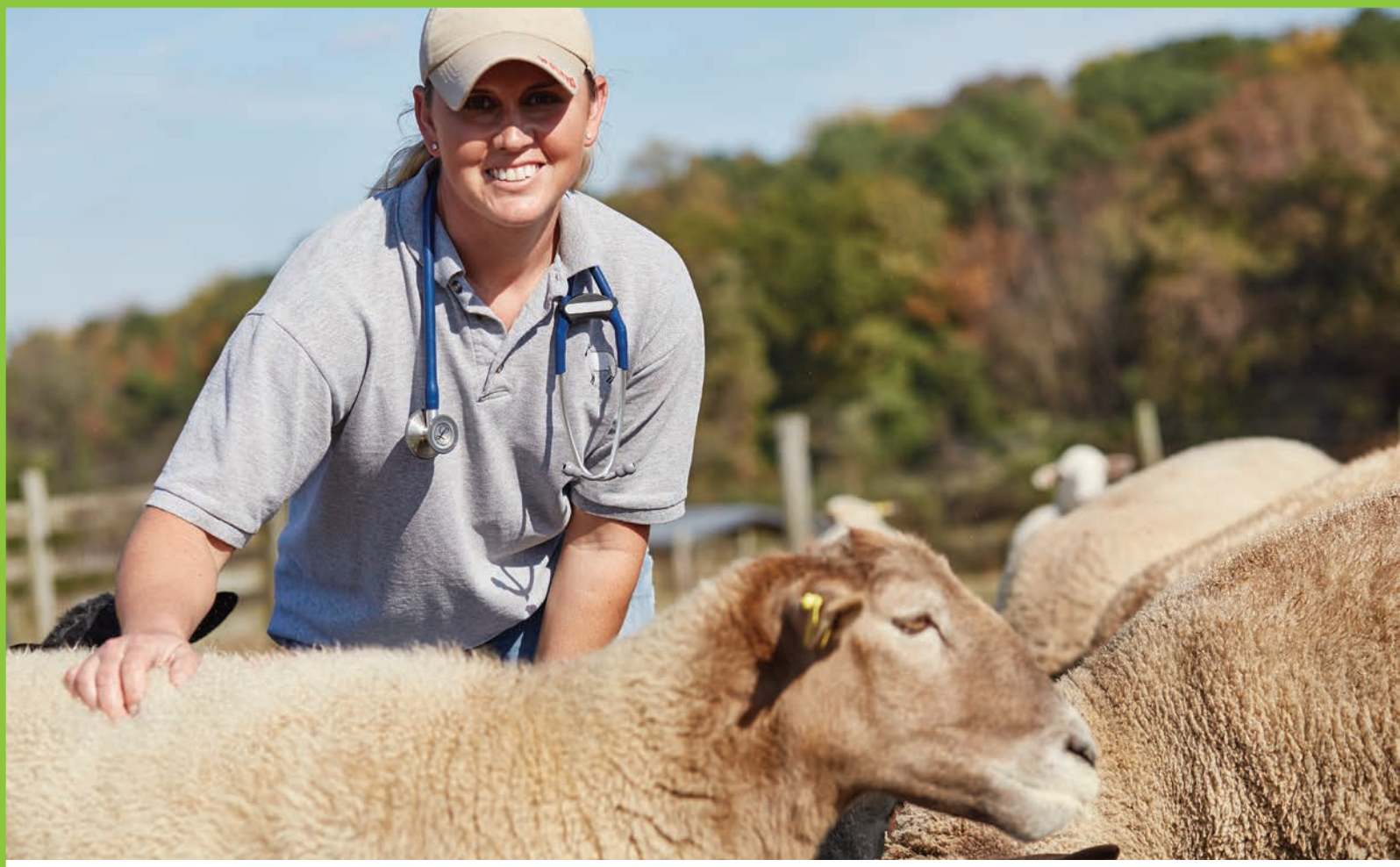
Of course there are also non-measurable benefits and costs that can be attributed to the DVM degree such as the benefits of daily interaction with animals, the satisfaction of helping animals and animal owners, or the costs of client conflicts. So the NPV only represents the measurable value of the DVM degree and not the total value.

Knowing the NPV of the DVM degree enables a comparison of alternative careers and career paths just as one compares alternative investment opportunities. This measure can be used with the perceived non-measurable benefits and costs to make more informed career choices and track the performance of the veterinary profession over time.

The NPV of the DVM is calculated by estimating the income received from the veterinary career less the compensation that may have been received without the DVM degree and the costs of obtaining the DVM degree. Consider the following measures for the 2016 graduating class from the 28 U.S. veterinary colleges:

- Mean total debt (debt plus the servicing costs) of a 2016 graduating veterinarian $253,778;
- Mean lifetime income of 2016 graduates was estimated at $5,114,294;
- NPV for men is estimated at -$43,038;
- NPV for women estimated at $308,892;

The NPV hit a low in 2014 for women and 2015 for men. The difference in the NPV for men and women is due to the higher debt and lower incomes of women at graduation and the higher opportunity costs of pursuing a veterinary education for men as compared to women.



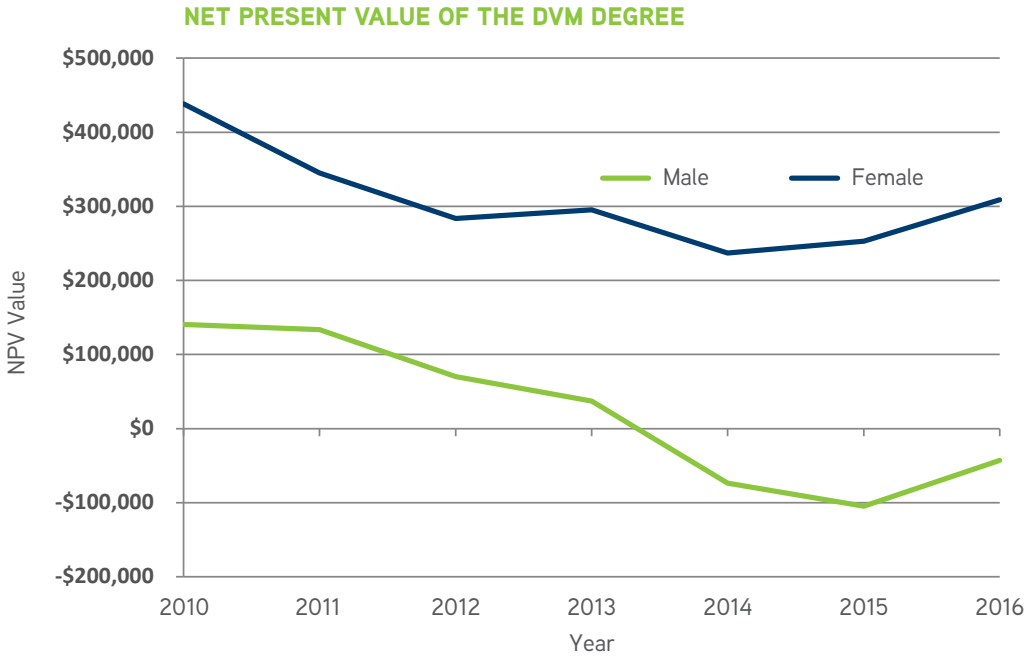

NET PRESENT VALUE OF THE DVM DEGREE
$500,000
$400,000
$300,000
$200,000
$100,000
$0
-$100,000
-$200,000
NPV Value
Male
Female
2010
2011
2012
2013
2014
2015
2016
Year

Figure 66

The opportunity costs refer to the lifetime income earning potential had veterinarians pursued an alternative career prior to entering veterinary college. The lifetime mean earnings of a typical bachelor's degree recipient are used to estimate this opportunity cost. And this alternative earning profile begins at graduation and thus a veterinarian gave up four years of alternative earning potential while in veterinary school and this must be overcome before there is a positive gain in earnings with the DVM versus the B.S. only.

The difference in the NPV of the DVM for women and men is mostly a result of the higher opportunity costs for men compared to women. With only a B.S., women earn only 72 percent of what men earn over their career, but earn more than 92 percent of what men earn at the beginning of their career as a veterinarian. And the difference between the starting salary of a DVM and B.S. has increased for women but declined for men over the last six years.

The drop in the difference of DVM and B.S. degrees for men from $21,353 to $18,277 indicates that the opportunity cost of men to gain a DVM is increasing, making the economic decision to obtain a DVM more difficult. On the one hand, for women, the opportunity cost of obtaining the DVM is declining as the difference between the DVM and B.S. starting salary has increased from $24,882 to $26,176[4].

These differences in opportunity costs may contribute to the growing concentration of women in the veterinary profession. For men, the negative NPV yields no return on the DVM, while for women the positive NPV indicates a positive return on investment.

**STARTING SALARIES BY GENDER AND DEGREE**

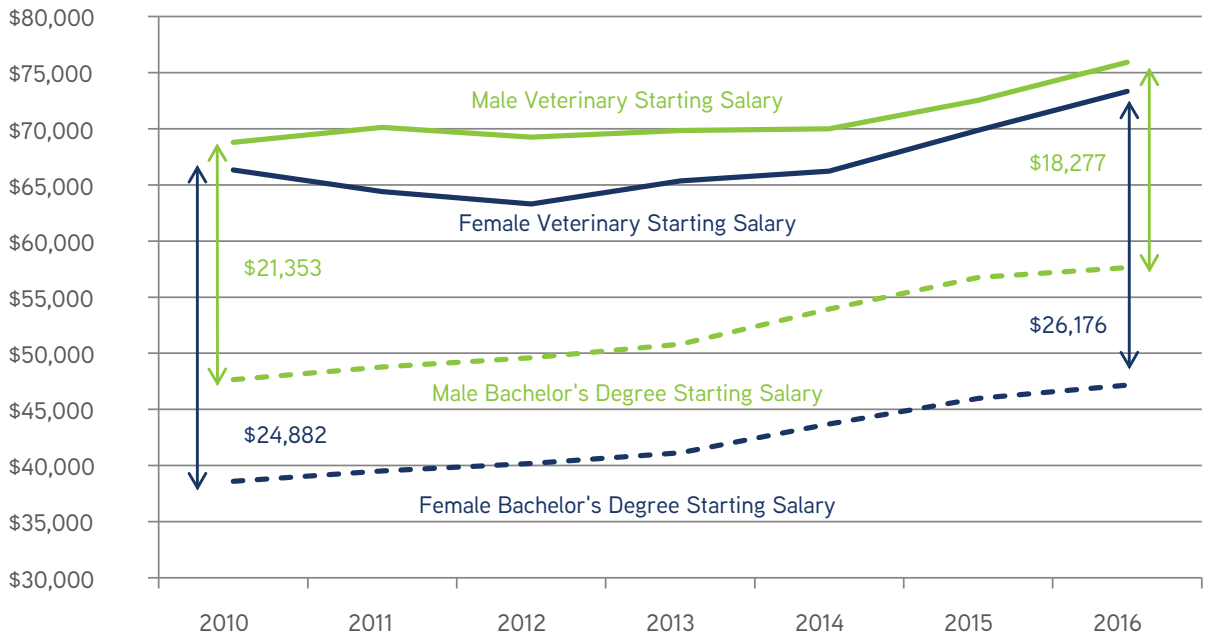



Figure 67

[4] Salary Trends Through Salary Survey: A Historical Perspective on Starting Salaries for New College Graduates
Salary Trends Through Salary Survey: A Historical Perspective on Starting Salaries for New College Graduates. (2017). Naceweb.org. Retrieved 5 January 2017, from https://www.naceweb.org/job-market/compensation/salary-trends-through-salary-survey-a-historical-perspective-on-starting-salaries-for-new-college-graduates/#appendix

## OWNERS VS. ASSOCIATES NPV

For many veterinarians, owning a practice is a primary career objective. But what exactly are the financial incentives, and how much is it worth, on average? Using the 2002-2015 compensation data from AVMA surveys that include roughly 15,000 private practice veterinarians, some 6,000 of whom are practice owners and some 9,000 associates, the effect of practice ownership on NPV of the DVM can be estimated.

### NUMBER OF OBSERVATIONS USED IN ANALYSIS

| | | Number of Owners | Number of Associates |
|---|---|---|---|
| Companion Animal | Male | 1,511 | 1,799 |
| | Female | 956 | 2,782 |
| Food Animal | Male | 1,133 | 824 |
| | Female | 243 | 379 |
| Mixed Animal | Male | 955 | 1,043 |
| | Female | 344 | 859 |
| Equine | Male | 576 | 610 |
| | Female | 270 | 717 |
| **Total** | | **5,988** | **9,013** |

Data are from 2002-2015 AVMA surveys.

Table 40

### Difference in Annual Income

The difference in the mean income between practice owners and associates could be due to factors other than practice ownership. In this dataset the difference in the mean income of all owners to all associates is approximately $20,000; owners earn almost 25 percent more than associates. But there are many factors that are different between owners and associates. For example, owners tend to be older and have more experience. The survey data indicate that owners average six years older and have seven more years of experience, and owners work more than 45 hours per week, compared to 43 for associates. In addition, though the sample has only slightly more men than women, 46 percent of men are owners compared to 26 percent of women. Each of these factors, and others, have an impact on veterinary income and thus might explain at least a part of the difference in income between practice owners and associates.

To separate the effect of the various potential factors from strictly the effect of practice ownership on incomes, four separate regression models were estimated. The other factors that affect income were discussed previously and listed in the experienced veterinary salary calculator.

### EFFECT OF OWNERSHIP ON ANNUAL INCOME BY GENDER AND PRACTICE TYPE

| | | Effect | Coefficient | Std Err | t-statistic | p-value |
|---|---|---|---|---|---|---|
| Companion Animal | Male | 4.80% | 0.047 | 0.018 | 2.66 | 0.008 |
| | Female | 3.50% | 0.035 | 0.019 | 1.86 | 0.062 |
| Food Animal | Male | 9.50% | 0.091 | 0.023 | 3.93 | 0 |
| | Female | n/a | 0.056 | 0.041 | 1.38 | 0.169 |
| Mixed Animal | Male | 10.80% | 0.102 | 0.024 | 4.32 | 0 |
| | Female | n/a | -0.016 | 0.032 | -0.5 | 0.62 |
| Equine | Male | n/a | 0.001 | 0.032 | 0.04 | 0.966 |
| | Female | -6.50% | -0.067 | 0.039 | -1.7 | 0.089 |

Note: Estimates in this table are based on a statistical analysis that controls for relevant correlates.

Data are from 2002-2015 AVMA surveys. Incomes are deflated to be in real 2015 dollars.

Table 41

As the table indicates, when controlling for relevant factors, most owners do indeed still earn more than associates. The income difference between owners and associates, however, varies across gender and practice type. Male practice owners earn a higher premium for ownership compared to women. And by practice type, male equine practice owners do not appear to make statistically significant different income from associates, and using an 8.9 percent significance level, female equine veterinarian's incomes are actually penalized for practice ownership compared to associates.

These estimates of the income premium to practice ownership are based on the sample collected and may change from year to year. For example, a drought could greatly affect the compensation for food animal veterinarians in a specific year. However, the length of the dataset, spanning 14 years, should minimize any sector-specific, year-to-year variation in income.

Lastly, these estimates may be overestimating the effect of practice ownership, due to what is termed "omitted variable bias." An extensive literature in the field of Labor Economics details this potential for omitted variable bias. The omitted variable here is something like business acumen. Veterinarians with a high degree of business acumen may earn a higher income, and the effect of this factor on income may not be captured by any other factor other than practice ownership; veterinarians with high levels of business acumen may be more likely to own a veterinary practice. The AVMA surveys have no measure of business savviness, and had it been included in the statistical models, may have reduced the effect of practice ownership on incomes.

## Difference in Lifetime Income

Using the regression equations that produced the salary calculator, along with the 2016 reported starting salaries of new veterinary graduates, age-earnings profiles are produced by gender, practice type, and ownership status. These are estimates, based on what veterinarians earn with different levels of experience, which is calculated as the year the survey was administered, minus the veterinarian's year of graduation, minus the number of years spent out of the labor force. If we assume a 40-year-long career with an age at graduation of 27, and retirement at 67, with practice owners owning a practice immediately upon graduation, we can estimate the additional lifetime income received from practice ownership in the table below. Accounting for the time-value of money as occurred in the NPV calculation with the same 4 percent per year discount rate, the present value of that additional lifetime income is computed. This present value is the value of the increased income from practice ownership in today's dollar value.

### EFFECT OF OWNERSHIP ON LIFETIME INCOME BY GENDER AND PRACTICE TYPE

| | | Additional Lifetime Income | Present Value of Additional Lifetime Income |
|---|---|---|---|
| Companion Animal | Male | $202,675 | $98,427 |
| | Female | $148,474 | $72,588 |
| Food Animal | Male | $370,869 | $184,071 |
| | Female | $0 | $0 |
| Mixed Animal | Male | $396,905 | $193,352 |
| | Female | $0 | $0 |
| Equine | Male | $0 | $0 |
| | Female | -$184,142 | -$87,731 |
| Note: Estimates in this table are based on a statistical analysis that controls for relevant correlates. | | | |
| Data are from 2002-2015 AVMA surveys. Incomes are deflated to be in real 2015 dollars. | | | |
| Discount rate used is 4 percent per year. | | | |

Table 42

Or, we can present these same findings in a yearly format by examining the age-earnings profiles of veterinarians, as shown in the figures below. The following four charts display the expected annual income for veterinarians in real 2015 U.S. Dollars.

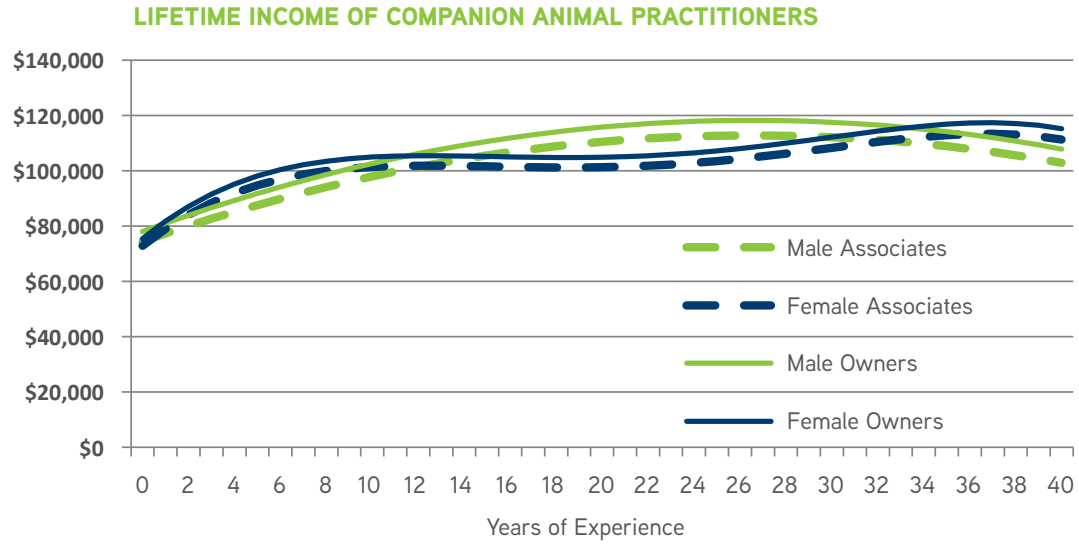



Figure 68

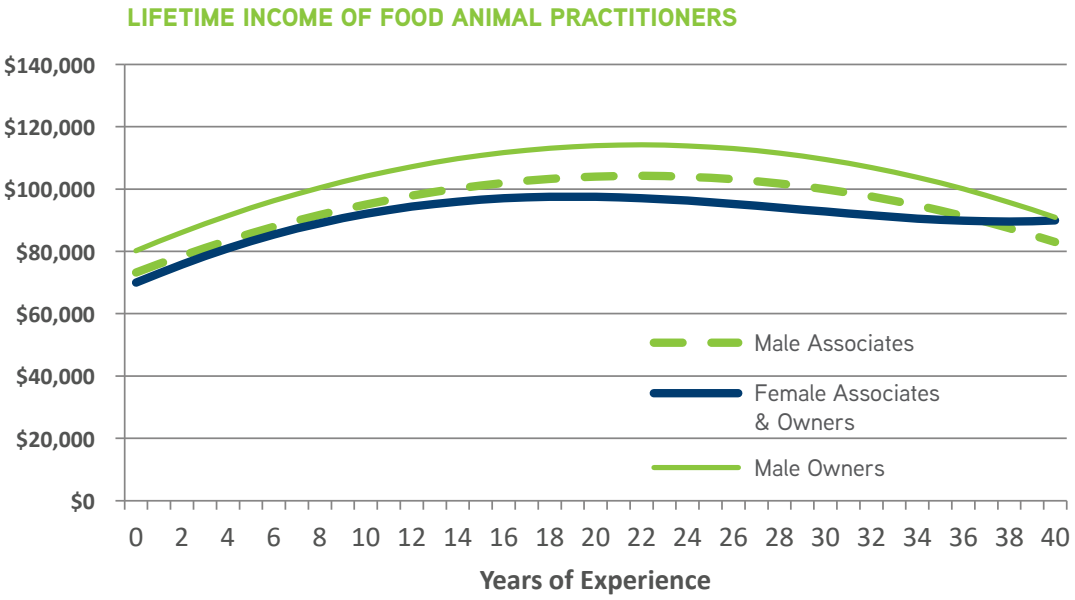



Figure 69

## LIFETIME INCOME OF MIXED ANIMAL PRACTITIONERS

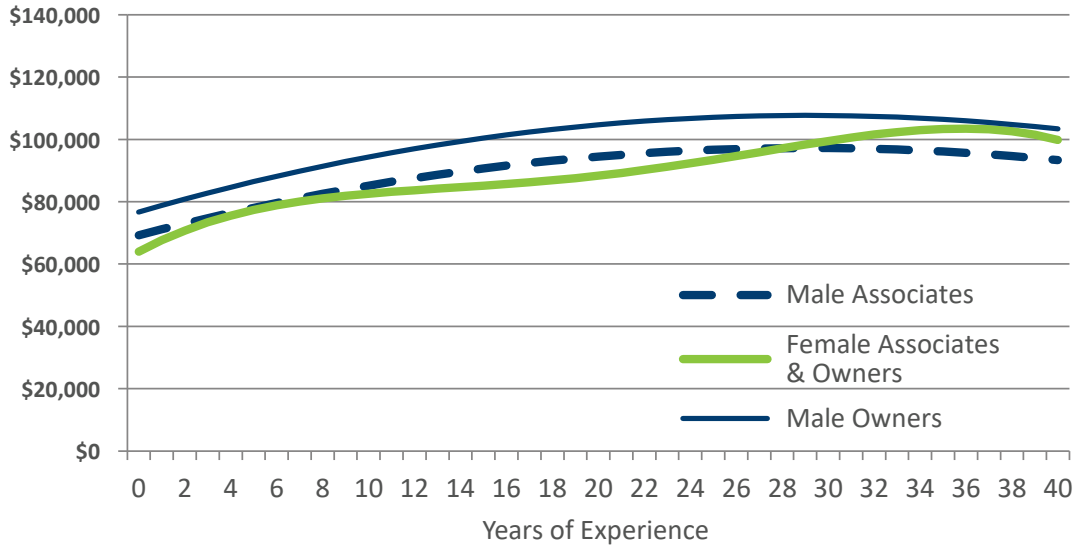



Figure 70

## LIFETIME INCOME OF EQUINE PRACTITIONERS

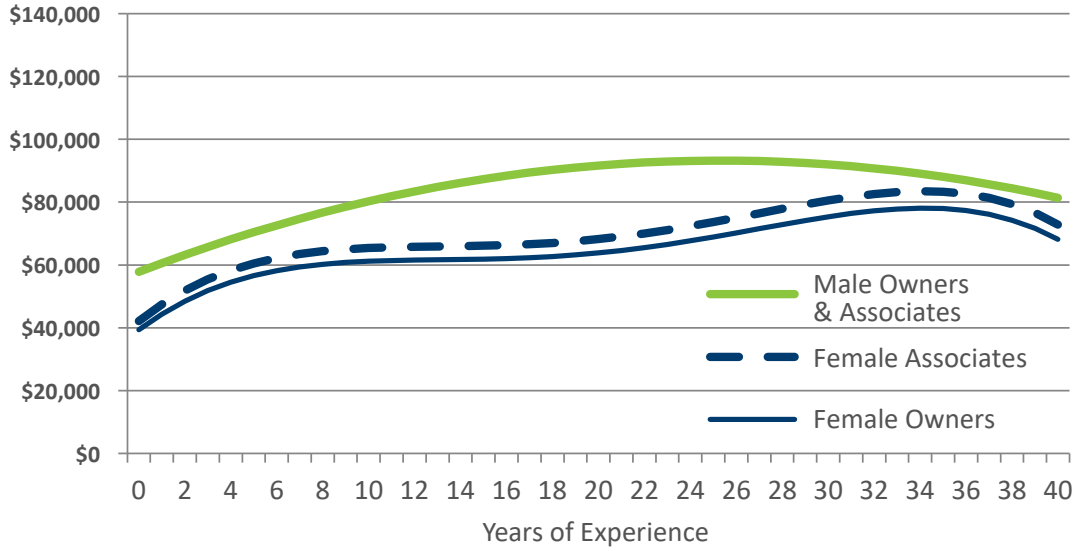



Figure 71

This analysis describes the difference in income between owners and associates, all other factors held constant. However, this analysis doesn't account for the potential wealth aspect or non-measurable benefits of practice ownership. In many businesses, an integral goal of the business plan, "asset rich and cash poor," is achieved by drawing the income that is necessary to meet lifestyle expectations and putting the other earnings back into the business to grow wealth for retirement.

There are other non-measurable benefits to being a practice owner such as increased work schedule flexibility. Studies like Goldin (2014) illustrate the relationship between flexibility and compensation: Careers that offer greater flexibility are more evenly compensated among genders, whereas careers with less flexible work schedules – where business depends on the relationship between a professional and his or her clients (like that of a veterinarian) – tend to have larger gender-wage gaps. If, as Goldin asserts, women tend to more highly value flexibility in their time, then it would make sense that they would become practice owners. Being a practice owner would increase their overall income to offset the effect of their desire for flexibility.

# DISCUSSION

This report has provided information on the market for veterinary labor, nationally, regionally and by practice type. Key indicators of the health of the market are unemployment rate, underemployment rate, income, wellness and satisfaction, and net present value. But these key indicators for a given year only provide a snapshot in time and provide neither a rear view mirror to see where you have been nor a windshield to see where you are going. This can only occur through the continued collection of the data and annual reporting of each indicator in a time series. In addition, knowing what has happened, what is happening and what may happen is not useful without knowing how to change course. Forecasting a course change, to date, requires the econometric analysis of the factors that affect each of these indicators. The importance of the econometric analysis is not just to determine the factors that affect the indicators but the relative importance of these factors. This knowledge allows a focus on the most important factor that drives change to produce the best results for the markets.

Over the last three years the key indicators have been reported and each year, across the board, the indicators generally point to an improving market for veterinary labor. Unemployment remains well below national levels, underemployment is negative, indicating an overall need for additional veterinarians in the workforce, the applicant-to-job ratio has fallen below 1 for the first time in eight years, incomes continue to rise and wellness is generally good throughout the profession.

The market still has considerable maldistribution problems, however, both between larger areas like regions and states and within states and metropolitan centers. Underemployment differs by gender and as the profession increasingly becomes largely female this difference in desired hourly work week may have implications for the number of veterinarians needed to provide the level of services demanded and the price of those services.

While wellness is generally good for the profession, there is clearly a percentage of the profession that is dissatisfied with their employment, compensation, the profession and their lifestyle, and we have identified the individuals' perception of their college preparation and their satisfaction with their current employment (the culture of the practice) as being statistically significant in explaining burnout. As we have noted previously, using the ProQoL tool to measure compassion satisfaction and compassion fatigue may not be the correct tool to measure wellness in the profession, especially to get at problems of drug abuse, suicide ideation, or other severe mental health issues. But clearly all of our measures point to a problem with a segment of the profession, and identifying the appropriate professionals to develop the best tools for measurement and determining the factors that are causing the wellness problems should be a priority for the profession.

The NPV of a DVM has been on a downward trend since 2010. This indicator provides a window into the value society places on veterinarians versus the investment required to become a veterinarian, and currently for males the investment cost exceeds the social value. Men's opportunity cost to attend veterinary college is very high in comparison to women's as men's earning potential with a bachelor's degree is much higher than for women. If the earnings from a STEM bachelor's degree were considered instead of an average across all bachelor's degrees (general) the opportunity cost would be considerably higher and the NPV more negative. This represents a market failure to produce veterinarians at a cost society is willing to pay and points to a problem embedded in the cost of education as well as in the value assigned to veterinary services.

The cost of education has changed rapidly over the last two decades as society has made a fundamental shift away from support of college education to foster a more enlightened populace, and embracing the idea that college grads earn more and thus should pay for their own college. This change will take time to work through the markets to shift support of the veterinarian supply chain from the taxpayer to the animal owner.

The value of veterinary services creates the demand for veterinarians. This is the main factor in determining veterinary salaries. The focus on medical care rather than preventative care may have influenced the animal owner's perception of value. This will be discussed in the following report on the market for veterinary services.

The market for veterinarians continues to improve and must be considered robust. As the economy has improved and household incomes have risen, so too has the demand for veterinary services and hence the demand for veterinarians. During this economic expansion veterinarians are likely to be busy, some of them extremely busy as the large negative underemployment number would suggest. Unfortunately, this may lead some to forget the lessons of the last recession and remove any urgency at improving value or reducing education costs. This is exactly the wrong message to draw from industry observation, and these problems should be addressed when resources are available – not when resources become scarce.

References
Goldin Claudia. (2014) "Grand Gender Convergence: Its Last Chapter" American Economic Review 104(4):1091-1119.

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