

EXECUTIVE SUMMARY

Equine veterinary practice accounts for less than 6 percent of all veterinary private practice types in the veterinary medical field. Veterinarians identifying as working with equids, whether in an exclusively or predominantly equine practice, or in a mixed animal practice, are a minority in the profession. Economic trends in the equine industry, and thus in the equine veterinary industry, were mostly negative in the years following the recession of 2008. Based upon AVMA data (2016) it is estimated that the U.S. horse pet population declined between 2011 and 2016, and the horse population on farms that reported at least \$1,000 in annual sales decreased by 10 percent (NASS, 2012). AVMA data also showed a 6.7 percent reduction in the annual income of equine veterinarians during that same period, while companion animal exclusive veterinarians saw an increase in annual income of 22.7 percent (Blach, 2015). Analyzing data gathered about the current state of the equine veterinary industry through the *AVMA-AAEP 2016 Survey of Equine Practitioners* will allow stakeholders to make informed and more directed efforts to strengthen the profession.

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

In this report, the following datasets were analyzed:

1. The AAEP membership database was utilized to develop aggregate gender, age and ZIP code information. This database can be found in the “Demographics” and “Geographic Distribution of Equine Practitioners” sections of this report. These data are referred to as “AAEP Members” in this section of the report. The number of observations in the AAEP membership database was N=7,432.

2. The *AVMA-AAEP 2016 Survey of Equine Practitioners*, which comprises survey responses from AAEP members, is referred to as “AAEP” throughout the report. The number of AAEP observations (respondents) was N=975.

3. The *AVMA’S 2016 Census of Veterinarians*, which comprises survey responses from AVMA members, is referred to as “AVMA” throughout the report. The number of AVMA observations (respondents) was N=2,545.

4. The combined dataset of AAEP (N=975) and the self-identified equine practitioners from the AVMA (N=81), is collectively called “Equine.” The number of such combined Equine observations (respondents) was N=1,056.

| Dataset | Observations (n) |
|-------------------------------------------------------------------|-------------------------|
| AAEP Membership database | 7,432 |
| AAEP - secondary sample | 975 |
| AVMA - comparative sample | 2,545 |
| Equine - main sample (81 equine respondents from AVMA + 975 AAEP) | 1,056 |

This report includes information on general economic conditions, demographics, the market for veterinary education, the market for veterinarians, the market for veterinary services, a portrait of equine veterinary practice, and an analysis of the impact of equine practices on economic activity in the United States.

GENERAL ECONOMIC CONDITIONS

Recent economic data for the United States show a low annual rate of growth. Close analysis of the Conference Board’s U.S. Leading Economic Indexes reveals that while the United States has been in an expansion since the middle of 2009, there are some indications that economic

growth may be slowing. Slower growth may limit the demand for veterinary services and result in reduced veterinary incomes. Another recession may occur within the next several years.

DEMOGRAPHICS OF EQUINE PRACTITIONERS

The descriptive statistics of equine practitioners include the demographic characteristics of age, veterinary medical college attended, gender, ethnicity, regional distribution, living and work location, and marital status.

What are the current demographics of the equine veterinary profession in the United States?

Most equine practitioners who responded to this survey graduated from one of the 30 U.S. AVMA accredited veterinary schools (90 percent Equine, 85 percent AVMA) (Table 2). Of Equine respondents, approximately 60 percent graduated before 2007, and 40 percent graduated after 2007 (Figure 9). There was a higher percent of AAEP members over the age of 51 years (43 percent) than Equine respondents (38 percent) or AVMA respondents (26.5 percent) in the same age group (Figure 10). The mean age of all three groups was approximately 46 years (AAEP Members: 49; Equine: 46; AVMA: 43). The distribution of respondents across years of graduation suggests that equine practitioners remain in practice longer than the general AVMA practitioner pool.

Many variables affected the data that were mined by the survey. The group of respondents ranged in age from veterinarians in their late 20s to those in their 80s. Participants ranged from veterinarians with less than one to more than 60 years of clinical experience. The survey results should be interpreted with these facts in mind, as vast changes have occurred in the equine veterinary profession, the equine industry, the economy and the culture in the past 60 years.

Of particular note is the age and experience distribution of male and female equine practitioner respondents. Thirty years ago, women represented less than 10 percent of all equine veterinarians, while today women comprise the majority of new graduates.

The male and female cohorts in the Equine group were very different. Males had an average age of 55 years, and an average of 29 years of experience. Many of these Equine males had more than 40 years of experience as equine veterinarians. In contrast, the average age of the females was 39 years and they had an average of 12.3 years of experience. Many of the Equine women veterinarians had less than 10 years of experience (median was 9 years), with almost 60 percent of the female respondents having less than 10 years of experience. The variance in age and experience between the male and female groups should be borne in mind when interpreting survey data.

Although females constituted the majority of Equine respondents (58 percent female, 42 percent male) (Figure 11), the inverse relationship between gender and age was notable. Eighty-two percent of Equine respondents over 60 years of age were male, while 83 percent of those less than 30 years of age were female (Figure 12). The shifting gender distribution within equine practice undoubtedly impacted some of the economic differences noted in this report and may have also had an effect on data involving equine practice ownership. For example, the differing percentage of male versus female practice owners noted in this report is likely related to higher numbers of the older (mostly male) Equine respondents acquiring ownership status due to their longer years in their careers. This ownership gender disparity may change in the future as females serve more years in the profession, but there is uncertainty as well about generational changes associated with risk tolerance and priorities (Figure 1 and Figure 2).

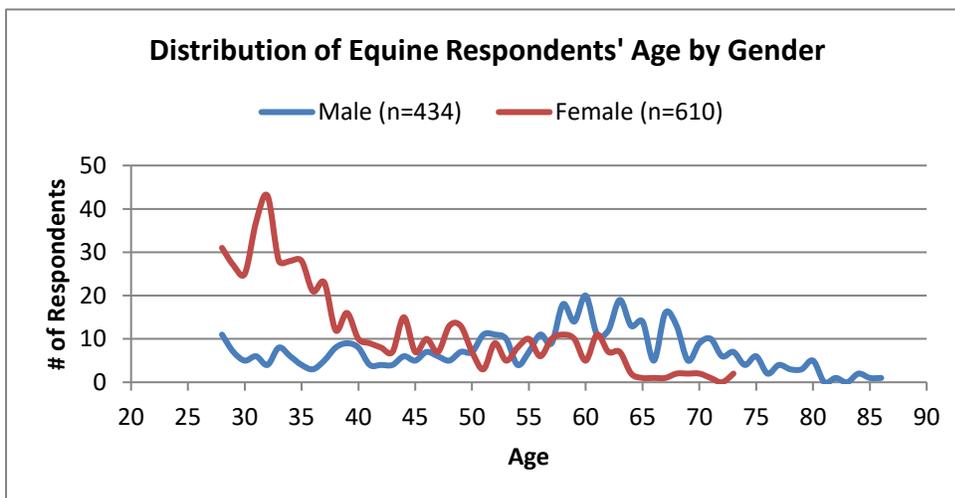


Figure 1: Distribution of Equine Respondents' Age by Gender

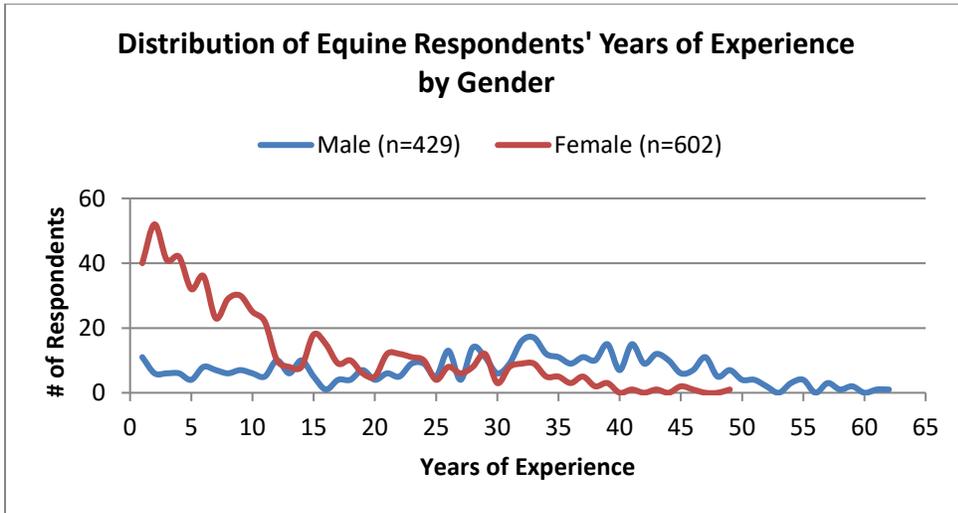


Figure 2: Distribution of Equine Respondents' Years of Experience by Gender

Of the Equine respondents, 65 percent were in exclusively equine practice, 12 percent were in mixed practice and 10 percent were in academia (Figure 13). Of these veterinarians, 95 percent were Caucasian (Figure 14). The most ethnic diversity was seen in equine practitioners less than 40 years of age, suggesting that cultural and socioeconomic barriers may be declining for entry to equine practice (Figure 15).

The United States Postal Service allocates ZIP codes for regions 0-9 in the United States (Figure 16). These regions are not only different geographically but were also found to have significant differences in past analysis by the AVMA regarding debt, income, unemployment and underemployment.

Representation of equine practitioners was highest in the West Coast (15 percent) and Southeast regions (12 percent) of the U.S., while the northern Midwest and central states (both approximately 6 percent) had the least representation among Equine respondents (Figure 17). This distribution may be related to a variety of factors such as population density, the willingness and ability of horse owners to support equine veterinary services, and seasonal challenges inherent to the equine industry.

The majority of Equine respondents (70 percent) were married, with 22 percent single, 6 percent divorced, and the remainder separated or widowed. These numbers were similar to those of AVMA respondents (75 percent married, 18 percent single and 6 percent divorced), suggesting that equine practice marital status is comparable to the veterinary profession at large (Figure 19).

Higher population density in some areas may play a part in equine practice locations; however, 51 percent of equine practitioners lived in a rural environment, 40 percent in suburban areas, and 9 percent in cities (Figure 18). Most Equine respondents were happy with their living environments, although 17 percent of the suburban dwellers would move to a rural location if opportunity arose (Table 3).

THE MARKET FOR VETERINARY EDUCATION

The report on the market for veterinary education includes the supply of veterinary education; the supply of seats at AVMA-accredited schools of veterinary medicine; outcomes of equine veterinarians following graduation and/or participation in externships, internships and residencies; expectations of veterinary students/recent graduates before entering the profession; the most important skills desired by employers; equine veterinary student debt, and the debt-to-income ratio (DIR) of equine veterinarians.

There are 30 AVMA-accredited veterinary colleges in the U.S., three AVMA-accredited Caribbean colleges, 16 AVMA-accredited colleges in other countries, and many other non-AVMA accredited veterinary colleges around the world. Recently, the number of applicants to veterinary colleges has seen an increase, with 6,667 in 2016; 7,071 in 2017 and 7,507 in 2018 (Figure 20). The expected supply of seats at AVMA-accredited schools is expected to remain constant at approximately 3,300 seats per year at the 30 U.S. colleges, 490 at the three Caribbean colleges and more than 500 at the 16 U.S.-accredited foreign colleges (Figure 22).

Since 2000, the number of new veterinarians entering equine practice has declined linearly from approximately 5 percent to about 1.1 percent in 2017 (Figure 24). More than 81 percent of AAEP respondents participated in externships while in veterinary school (Figure 26), and among Equine respondents, 5.7 percent were currently participating in an internship and 47.7 percent had participated in an internship previously (Figure 27). In contrast, the AVMA survey sample showed only 26 percent of general veterinary practitioners had participated in an internship, while 74 percent had not. This disparity between equine and general practitioners may be a result of the employment climate in equine veterinary medicine, an environment where most available jobs require an internship or several years of clinical experience. Internship experience has become a de facto entry requirement to equine practice in many sectors of the industry.

What factors affect the decision of equine veterinarians to pursue an internship?

Many veterinary students do not have the opportunity to hone their diagnostic and technical skills during veterinary school due to the high value of many equine patients, a low clinical case load, and/or client attitudes. As a result, new graduates can rarely be seamlessly integrated into an equine practice without significant mentoring and skill-building. Practice owners may have neither the time nor inclination to take on this role, and over time, completion of an internship has become considered nearly essential for successful employment in the equine veterinary field. Data from this study show that respondents who completed an internship desired to improve their clinical skills and practice better medicine. Rather than showing a lack of confidence, as some have suggested, this may indicate a realization of the limitations of their training and the need for focused skill building at the commencement of their career (Table 7). The data show that most internships provided comprehensive and focused training opportunities through clinical skills acquisition, case rounds, and close mentoring.

Internship responsibilities reported by AAEP respondents included primary on-call emergency duty with mentoring available (82.1 percent), primary on-call emergency duty with no mentoring available (16.9 percent), primary client communication (70.1 percent), case rounds (68.2 percent), overnight treatment duty on a regular basis (60.9 percent), Journal Club (52.7 percent), hands-on procedural rounds designed specifically for learning a skill or technique (31.6 percent), and radiology rounds (23.6 percent) (Table 8).

More female Equine respondents (64.3 percent) reported participation in an internship than Equine males (37.9 percent). In contrast, the AVMA sample reported an approximately equal percentage of males (23.5 percent) and females (27.6 percent) who had participated in an internship (Figure 28). Because 40.6 percent of all internships reported by Equine respondents have been completed in the last five years (AVMA 29.5 percent), the markedly increased percentage of females in this cohort may explain the apparent gender difference in participation rates in the Equine dataset (Figure 29).

Equine respondents from graduation years 2012-2016 reported an average annual internship stipend of \$26,915 while AVMA respondents from the same graduation years reported an average internship salary of \$29,174 (Table 10). About one-third of AAEP respondents reported

receiving free housing as a part of their compensation package (Figure 32). Over time, the number of benefits received by interns has increased, as has the percentage of interns receiving them. In the past five years, 65.5 percent of AAEP interns reported receiving health insurance, 71.4 percent professional liability insurance, 75.6 percent continuing education expenses, and 75 percent professional licenses and association dues (Table 14).

Except for improving their understanding of business management, the majority of Equine respondents reported that their expectations of their internship were met well to extremely well (Figure 39). Fully three-quarters of respondents would participate in the same internship again if given the option (Figure 40).

Many equine practices have created business models that rely upon the skills of interns to provide after-hours evaluation of patients in hospital and ambulatory settings at a cost that is less than that of employing experienced veterinarians. This mutually beneficial paradigm allows older doctors to experience the satisfaction of teaching and mentorship while experiencing a financial benefit and allows new graduates access to experienced practitioners' clients and patients while benefiting from the experience of their employers. The employer gives of their time and knowledge. The intern trades their hard work for valuable education and access to experiences that they might otherwise not have the opportunity to share.

Of Equine respondents, 20.9 percent reported participation in a residency program at some point during their veterinary career, compared to 13.0 percent of AVMA respondents (Figure 41). Of Equine respondents who desired to pursue a residency, over three-quarters either completed a residency or at the time of the survey were participating in one (Figure 42). Ninety-five percent of these residencies were in academic settings with just a few in private-referral settings (Figure 46). Participation in residencies showed an increasing incidence from 2005 to 2014 for both Equine and AVMA respondents, followed by a sharp decline (Figure 43). Surgery (44.3 percent), Internal Medicine (28.5 percent) and Theriogenology (11.8 percent) were the most common specialties reported by Equine respondents (Table 20).

An inverse relationship was noted between graduation year and Equine respondents' perception of how well their veterinary school education prepared them for practice. Among the Equine respondents, 51.4 percent of those who graduated in 2012-2016 were satisfied "moderately well," "not too well" or "not well at all" with their veterinary education, compared to 39.3 percent of AVMA respondents. Eighty-nine percent of Equine respondents who graduated in 1967-1976 reported that their education prepared them "very well" to "extremely well." This percentage dropped in a linear fashion, with only 48.5 percent of Equine respondents in graduate years 2012-2016 reporting the same (Figure 48). This trend line parallels the variation in respondent mental health found in this study, with a linear decline in overall mental health with more recent graduation (Figure 122). Factors that may contribute to the decreased satisfaction with educational preparedness could include markedly increased amounts of information that must be learned during the four years of veterinary school curriculum, fewer opportunities to see clinical cases due to the proliferation of private-referral hospitals, licensing requirements to be competent in all species, and declining emphasis on equine skills as the equine population has dropped. There was, however, no data collected in this survey to capture reasons for the decline in educational satisfaction.

AAEP respondents opined that the entry level clinical skills considered essential to enter the profession included the ability to: diagnose and treat a foot abscess (90.6 percent), repair simple lacerations (90.4 percent), work up, treat and make recommendations for a colic case in the field (88.7 percent), and perform physical and ophthalmic exams (87.6 percent). Diagnosis of uncomplicated lameness with diagnostic nerve blocks, obtaining radiographs of limbs, setting up preventative health protocols, and placing intravenous catheters and subpalpebral lavage systems were expected as entry level skills by more than 80 percent of respondents. Over 70 percent of AAEP respondents also expected new practitioners to be able to remove shoes, perform basic dental procedures, perform castration on a recumbent patient under general anesthesia, and complete routine reproductive procedures such as a Caslicks and uterine culture. Over 60 percent expected new practitioners to be able to induce and recover a patient in the field with intravenous anesthesia, ultrasound a mare to diagnose a singleton pregnancy at 16-18 days post ovulation, and obtain samples from or inject substances into synovial

structures such as joints or tendons. Skills in more advanced imaging, diagnostic sampling and surgery were expected by less than half the respondents (Table 22). Expectations for the specific entry level clinical skillset differed between respondents who had been in practice for more than 20 years and those in practice for fewer than 20 years (Table 23).

AAEP respondents were also asked to rank 10 workplace competencies on a scale of one to 10 for their importance for new associates (Table 24). In general, people-skills ranked higher than organizational, technical or writing skills. People-skills were cited as the most important competency by 63.9 percent, followed by client communication (21.2 percent), and customer services skills (4.8 percent).

AAEP membership data show that many young veterinarians fail to renew their AAEP membership four years from their graduation date from veterinary school, and that the trend is slowly increasing (Figure 49). Starting with the Class of 2000, almost 40 percent of former AAEP members dropped their membership within four years of their graduation date. Of the Equine respondents who were currently not employed in equine medicine and reported the number of years they were employed as an equine veterinarian in their first job, 67.4 percent were in the equine profession from zero to five years after graduation, 14.6 percent six to 10 years, 5.6 percent 11-15 years, and 12.4 percent 16 years or more (Figure 50). When the 89 respondents who reported leaving the equine veterinary sector were analyzed by graduation year, 100 percent of respondents who graduated within the last five years and subsequently left equine practice did so within five years of graduation, followed by 91.3 percent from 2007-2011, and 27.8 percent from 1987-1996 (Figure 51).

What factors affect starting salaries for equine veterinarians?

Starting salaries in the equine veterinary field lag behind those offered in other types of private practice. AVMA respondents reported higher post-internship salaries than Equine respondents on average, except for male Equine respondents who graduated in the period 2012-2016; these graduates reported an average starting salary of \$61,867 compared to AVMA males who reported \$61,810 (Table 15). In contrast, female Equine respondents who graduated from

2012-2016 reported an average starting salary of \$51,109 compared to AVMA females who reported \$70,452.

Associate veterinarians starting their careers in equine practice face several challenges. Because of the high dollar value of many of the horses that they encountered as patients in veterinary school, many were not allowed the opportunity to practice hands-on clinical skills, communicate with owners, or develop independent case management abilities. Data show that survey respondents value a comprehensive list of entry level skills that many job candidates may not possess (Table 22 and Table 23). In addition, horse owners are frequently very bonded to a specific veterinarian and are often reluctant to allow care by a new doctor.

These realities create an environment where new associates have difficulty producing sufficient production revenue to support robust starting salaries. Many of these young doctors struggle to produce sufficient income to support the total cost of their compensation for several years, if not longer. Most practice management resources indicate that the total cost of compensation (including salary, benefits, payroll taxes, etc.) for associate veterinarians should not exceed 25 percent of collected gross revenue production. When equine practice owners determine starting salaries for new graduate associates, they must determine how much of their profit they are able and willing to invest in mentoring these young veterinarians during that period until they can become self-supporting within the practice.

If a new graduate was able to bring in personal gross service revenue from production of \$200,000 in their first year of employment after internship, the Equine female respondent's average salary of \$51,109 would represent 25.5 percent of revenue, even without considering the additional costs of employment. The Equine male respondent's average starting salary of \$61,810 would represent 30.9 percent of production before considering other relevant expenses.

The study data indicate that the median personal gross revenue from production for practice owner Equine respondents was \$385,832, and the mean personal gross revenue from production for associates was \$356,500. For AVMA respondents, the median personal gross

revenue from production was \$500,000 for owners and \$450,000 for associates (Table 156). Among those in their first five years of practice, the median personal gross revenue for Equine respondents was \$300,000 and for AVMA respondents was \$410,000 (Table 157).

With the current sluggish growth or outright contraction of the equine industry (dependent on geographic region), there is also less growth in demand for services. Mature practitioners wishing to prepare for a transition out of practice often must transfer some of their own work (and the associated revenue production) to younger associates to create an exit strategy. In some cases, there may simply not be enough revenue produced to support two veterinarians, but orderly transition and emergency coverage demand the addition of another practitioner. Under these conditions, robust starting salaries are often impossible.

The gender disparity in starting salaries after internship for Equine respondents in the last five years is approximately \$10,000, or 16.2 percent lower for females (Table 15). This negative finding reflects the broader issue across industries that also find a gender wage gap between 8 percent-20 percent in the United States (Graf, Brown, and Patten, 2018). Scarcity increases perceived value; in equine veterinary medicine, this disparity among recent graduates may arise in part because of the low numbers of males entering the profession compared to females. In addition, 60 percent of current equine practice owners are male, which may influence their decision to hire male associates over females, a decision that could be based on the status quo bias (the tendency for people to like things to stay relatively the same), resulting from the exposure effect (the tendency for people to like things merely because they are familiar with them). Gorman (2005) has looked at many aspects of gender-related stereotypes on work environment. The data report that, on average, Equine male respondents add an additional \$477,929 to revenue while Equine female respondents add an additional \$346,638; this disparity may also be influencing the gender wage gap identified (Table 158). However, it is critical to note that the average age of male versus female respondents is 55 years versus 39 years, respectively, and so the average revenue increase is likely being influenced by experience and skills gained over time.

What factors affect the debt of equine veterinarians?

Data show that the educational debt of new equine veterinarians is lower than those entering other types of practice. Average educational debt of all AVMA graduates was \$142,732 and those entering equine practice was \$131,325 in 2016 (Figure 54). This difference may be due to students who are interested in equine practice having awareness of the lower starting salaries, and subsequently making more careful financial choices. It is also possible that it is more affluent students who are choosing equine practice. The data show that about 30 percent of graduates who entered equine practice had no debt, compared to about 20 percent who entered companion animal practice.

More than two-thirds (70.8 percent) of Equine respondents incurred debt from their veterinary medical education (AVMA: 79.2 percent). Overall mean student debt from post-secondary education of Equine respondents for all graduating years was \$92,918 compared to AVMA respondents who reported an average of \$114,202 (Table 27). The average debt among Equine respondents who graduated within the last five years was \$168,710. The average debt among Equine respondents who graduated 6-10 years ago was \$125,374. From 2001 to 2015 mean student veterinary debt of new grads has more than doubled (Table 29).

The mean educational debt of the 437 Equine respondents who did internships (\$109,865) was considerably higher than the 326 equine graduates who did not (\$70,201) (Table 31). It is uncertain why this would occur. It is possible that graduates of veterinary schools with higher tuition and attendance costs are more likely to pursue internships. However, the 139 Equine respondents who undertook residency training reported lower mean student debt than those who did not pursue specialty training. One explanation is that those planning a residency training were exceptionally frugal or perhaps had more financial support from their families.

There is an increasing gap between student debt totals and average professional income. Most Equine graduates had little to no pre-veterinary student debt (33.1 percent and 61.3 percent, respectively) (Figure 55). This was true no matter what decade they graduated in (Figure 56). However, 70.8 percent of Equine respondents reported that they incurred debt during veterinary school, and 53.5 percent of these veterinarians reported they were still paying off debt. Of those still paying on educational debt, 13.2 percent said that more than 30 percent of

their compensation was used to service debt. An additional 12.2 percent reported that they were utilizing 21-30 percent of their compensation toward debt, with an additional 23.5 percent of respondents who reported spending 11-20 percent (Figure 57). Of those who graduated within the last 10 years, the mean percentage of compensation used to repay educational loans was 20 percent (Table 28).

How does the Debt to Income Ratio (DIR) of equine vets compare to other veterinarians?

The gender weighted average DIR of new veterinarians who work full time in equine medicine was 2.48 (median was 2.10) in 2016. The weighted average DIR of all new veterinarians working full time in 2016 was 1.71 (median was 1.62) (Table 43). According to financial professionals, the level of debt-to-income that can be serviced in professional fields without posing serious financial stress is 1.4:1.

THE MARKET FOR VETERINARIANS

The AVMA/AAEP survey queried respondents on their professional income and benefits. The results were used to assess the net present value of an equine veterinary professional education. Employment status and work schedule were determined, and respondents were asked to rate their satisfaction with their current position, working hours, on call responsibilities, income, and geographic location. The section had multiple questions on health and wellness. Respondents rated their physical and mental health, and provided historical data about work related injuries, including the effect of injury on their work and daily activity. The section concluded with the ProQOL survey instrument, a standardized set of questions designed to measure three subscales of wellbeing: compassion satisfaction, burnout and secondary traumatic stress.

The data were evaluated for statistical significance and trends relating to respondent gender, age, year of graduation, veterinary college, and level of education. Additional filters included participation in internship or residency, board certification, income level, and whether the respondent was a practice owner, practice associate or an employee at a university or other

institution. The specific practice sector and geographic location that each respondent worked in was examined, as was the business model and size of their workplace.

Income and the Gender Gap

Mean professional income for Equine respondents was \$99,000 annually, with practice owners reporting \$118,000 and associates reporting \$78,000. In comparison, AVMA respondents had a mean income of \$112,000, with \$159,000 reported for practice owners and \$90,000 for associates (Figure 59). Income levels were noted to rise in a roughly linear fashion with years of experience; equine veterinarians who had been in the workplace less than five years reported the lowest mean incomes while those who had 30 or more years of experience had the highest (Table 45).

Practice ownership had a statistically significant impact on professional income (p -value <.001) among both the Equine and AVMA respondents. Mean annual income reported for practice owners and for non-practice owners differed by about \$40,000 for Equine respondents and about \$69,000 for AVMA respondents (Table 52). Participation in an internship was associated with lower mean income levels among peer graduation years (Figure 62), but board certification was associated with higher mean income levels (Table 53). Employment in the racing, reproduction or performance horse sectors was also associated with higher income levels (Table 54).

Separating mean income by gender, in all comparisons the mean income of male respondents exceeded female respondents. Female Equine practice owner respondents had a mean income that was \$55,000 less than male owners (\$85,000 female vs. \$140,000 male). Among AVMA respondents, male owners had \$66,000 more in mean income (\$186,000) than their female counterparts (\$120,000). A \$24,000 difference between male and female Equine respondent associates, and a \$15,000 difference between male and female AVMA respondent associates were measured. Again, it is essential to recall the age and experience differences between the male and female cohorts when observing these data (Figure 59).

For both Equine and AVMA respondents, the difference in mean income between genders was large and statistically significant (Equine: *p-value* <.001; AVMA: *p-value* <.001) (Table 49). The highly significant wage gap that was noted between male and female respondents was calculated by multiple linear regression analyses to be about \$30,000 for Equine respondents and \$50,000 for AVMA respondents (Table 55). It must be noted that the male Equine respondents had a mean of 29 years of experience versus the female Equine respondents, who had a mean of 12.3 years of experience in this sample.

While it is impossible to know with certainty why this gap exists, according to data that look at the general population, a wage disparity of 20 percent is observed (Graf, Brown, and Patten, 2018). According to the Pew Research Center, the gender gap in pay has narrowed since 1980, particularly among younger workers, it still unfortunately persists. In 2015, women earned 83 percent of what men earned, according to a Pew Research Center analysis of median hourly earnings of both full- and part-time U.S. workers. Based on this estimate, it would take an extra 44 days of work for women to earn what men did in 2015. By comparison, the U.S. Census Bureau found that women earned 80 percent of what their male counterparts earned in 2015 when looking at full-time, year-round workers only. However, for adults ages 25 to 34, the 2015 wage gap is smaller. Women in this group earned 90 cents for every dollar a man in the same age group earned (Graf, Brown, and Patten, 2018).

Factors that may also contribute to the wage gap in veterinary medicine, particularly in equine practice, include the variance in number of years of experience between males and females (male Equine respondents had a mean of 29 years of experience versus the female Equine respondents, who had a mean of 12.3 years of experience in this sample). According to AAEP leadership, there may be a perception that females produce less revenue for a practice than equivalently experienced males, for a variety of reasons. Possible contributors to these perceived reasons may be family responsibilities, confidence, or efficiency. In addition, in recent years some leaders in the equine veterinary industry have observed there seems to be a strong trend in the marketplace for new graduates to start out at a practice as an associate and then start a solo practice on their own without sufficient knowledge of business. Unsure of how to

set prices but eager to build their client base, they may charge reduced prices or may comply with unreasonable requests to work pro bono. It is postulated that due to geography, cases cannot always be seen in the most efficient manner and instead these veterinarians may feel compelled to give phone advice for free. In addition, solo practices may struggle to afford diagnostic equipment that is not used every day but is essential to meet client expectations. Profitability (and thus income) could be adversely affected by these factors. These factors may contribute to the reported lower earnings for females, who make up the majority of recent graduates.

Mean income of the AAEP respondents was shown to vary by size of practice, with those employed in larger practices earning more than those employed in smaller practices (Figure 61). Data showed that veterinarians who worked in academia reported higher mean incomes than those in private practice. AVMA respondents who worked in Industry reported the highest incomes (Table 50). When the distribution of mean income of Equine respondents who participated in an internship and those who didn't was plotted by graduation year (Figure 62), there was very little difference in mean incomes reported by graduates in recent years. There was nearly \$30,000 more income reported by Equine respondents with residency training compared to those who did not complete a residency (Table 48).

For both the Equine and AVMA sample, the variation in mean incomes between the 10 regions was substantial (Table 51). The region with the highest mean professional income in the Equine sample was Region 4 (\$115,410). Kentucky is located in Region 4, and Lexington, Ky., is known as the "Horse Capital of the World" because it is heavily populated with horses and large Thoroughbred breeding operations. Region 5 had the lowest reported Equine mean income at \$83,640. The mean income that veterinarians reported they earned was statistically significant ($p\text{-value} = .011$), with respect to the primary equine sector served.

What benefits are offered?

More than 75 percent of Equine respondents received the benefits of continuing education expenses, licensure, liability insurance, and association dues. A little over 60 percent were granted discounted veterinary care and continuing education leave. Health insurance (52.8 percent) and paid vacation (51.4 percent) were received by a little more than half of Equine respondents. Less than 10 percent were granted paid maternity or paternity leave (Table 56).

Do equine veterinarians have retirement assets?

Among AAEP respondents, 63.8 percent reported having assets for retirement. The primary asset reported was a combination of assets (36.2 percent) followed by a 401(k)/Keogh/IRA fund (31.3 percent) (Table 58). Nearly 80 percent reported having a 401(k)/Keogh/IRA account (Table 59). Nearly 29 percent of these respondents indicated they were either very or extremely confident in their financial preparation for retirement, while 34.5 percent indicated they were not very or not at all confident, and 36.8 percent of respondents were moderately confident.

Are equine veterinarians having families?

Regarding family status, just over half of the Equine respondents (52.1 percent) indicated they had children during their professional career. Another 31.4 percent of respondents reported that they did not have children, nor did they plan to have children during their professional career, while 16.5 percent of respondents did not currently have children but plan to have children in the future during their professional career (Figure 64). With regard to available maternity or paternity leave, 40.1 percent of Equine respondents had no maternity/paternity leave offered, and 31.8 percent had one-two months (Figure 66). Of those with leave, 41.2 percent of respondents reported that none of the maternity or paternity leave was eligible for compensation, and 34.6 percent reported one-to-two months of leave was eligible for compensation (Figure 67). Almost three-quarters of AAEP respondents perceived that policy relating to maternity or paternity leave was not well addressed in their employment contracts (Figure 70).

What is the Net Present Value (NPV) of a veterinary degree?

Net present value (NPV) of the DVM/VMD degree is a key performance indicator for the profession as it provides an indication of the willingness of society to compensate veterinarians for the investment in the DVM/VMD degree. The NPV provides the current value of the lifelong earnings of the veterinarian above what they would have earned had they not obtained their DVM/VMD degree.

Net present value is the difference between the present value of cash inflows (income) and the present value of cash outflows (expenses). Thus, in examining the NPV of a veterinary education, one would look at the present value of the expected cash flow from being employed as a veterinarian over the course of the career minus the present value of the investment in earning the veterinary degree. If the NPV is positive, then the investment yielded more inflow than outflow. In the model presented here, the veterinary degree is compared with the bachelor's degree to determine whether the additional investment in the DVM/VMD is borne out by equivalently increased cash inflows over the course of the career.

The NPV has been declining in the general veterinary profession since 2010. The primary reason for the declining NPV is increasing opportunity costs: Starting salaries for bachelor's degree holders grew more than 19 percent during this time, whereas starting salaries for the DVM/VMD degree holders grew approximately 5.5 percent. If the earnings gap between DVM/VMD and bachelor's degree holders continues to narrow, veterinary students may begin to view the DVM/VMD degree as not worth the price of admission to the veterinary profession. The decline in the NPV for men has been much steeper than for women and this may be a contributing factor to the changing gender distribution in the profession. Males have a much larger opportunity cost¹ to become a DVM than do women, as the difference between mean veterinary income and the mean income of a general bachelor's degree recipient is substantially less for men than for women (Figure 72 and Figure 73). Table 62 shows the income levels that would be necessary for each group to enter a positive NPV range relevant to the amount of debt carried. The report stated that small increases in annual income (around

¹ The opportunity cost refers to the lifetime income-earning potential had veterinarians pursued an alternative career prior to entering veterinary college.

\$2,000) could potentially offset large increases in debt (up to \$50,000), and have a strong influence on the NPV of the equine veterinary degree.

Employment Status and Hours Worked

Slightly more than four-fifths (80.5 percent) of Equine respondents reported employment in clinical veterinary medicine (AVMA: 67.0 percent); 11.4 percent were employed but not in clinical veterinary medicine (AVMA: 23.6 percent); 6.6 percent were retired (AVMA: 6.0 percent); and 1.5 percent were unemployed (AVMA: 3.4 percent) (Table 63). Of the Equine respondents who were not practicing in clinical veterinary medicine, approximately 71 percent were in professor roles (AVMA: 26.1 percent) and 24.7 percent in an academic clinician position (AVMA: 19.4 percent), followed by 2.2 percent of respondents who were managers (AVMA: 21 percent), and 2.2 percent in another type of field (AVMA: 26.8 percent) (Table 64).

Among employed equine practitioners a wide variation of hours worked per week was reported; the majority worked between 40-60 hours, which exceeded the average work hours reported by the AVMA group (Figure 74). The mean hourly reported work week for Equine respondents was 54.9 hours for males and 56.6 hours for females with the majority (60.4 percent) between 40 and 60 hours per week. For the AVMA survey respondents, the mean hourly work week was 48.5 hours for males and 45.9 hours for females, with the majority (68.0 percent) of AVMA respondents between 40 and 60 hours per week (Table 65). Near all of male (89.5 percent) and female (89.4 percent) Equine respondents reported working more than 40 hours a week. By comparison, 80.8 percent of male AVMA respondents and 78.3 percent of female AVMA respondents reported working more than 40 hours a week (Figure 74).

Among those in clinical veterinary medicine, 94.6 percent of Equine respondents reported working full time and the remaining 5.4 percent were employed part time. In the AVMA sample, 89.0 percent were employed full time and 11.0 percent were employed part time in clinical veterinary medicine (Figure 75).

On average, Equine respondents employed full time worked 10 emergency hours during a typical week, compared to 7.1 hours for full-time AVMA respondents (Table 67). Almost one-

third (32.6 percent) of AAEP respondents working full time reported that they performed 26 percent to 50 percent of the total amount of on-call or emergency duty at their place of employment, and 24.9 percent reported that they were responsible for 100 percent of this duty (Figure 80). The data reflect the high number of solo or small (two to three DVM) practices in the equine veterinary industry. Among 72 solo practitioner respondents, 46 (63.9 percent) were on call or performed emergency duty 100 percent of the time. Not surprisingly, the higher the number of full-time equivalent (FTE) veterinarians at the place of a respondent's employment, the more likely respondents reported lower on-call/emergency duty percentages (Figure 81).

Satisfaction with employment

Survey data showed that Equine respondents tended to be more satisfied with their work than AVMA respondents. Male Equine respondents reported higher satisfaction levels than female equine respondents. Of female Equine respondents, 34.3 percent were moderately, not too, or not at all satisfied, while 65.7 percent were very or extremely satisfied (Table 74). Higher satisfaction levels were reported in older graduates as their years of experience increased (Table 76). The high debt levels and low salaries of those who have graduated more recently undoubtedly impact satisfaction with employment. In addition, differing priorities of different generations may also drive these findings.

Regression analysis showed that respondents who were practice owners, those with higher incomes and those who "felt well prepared by their education" were significantly likely to report high levels of job satisfaction while respondents who had participated in a residency reported less job satisfaction (Table 80). Equine respondent practice owners were much more satisfied than Equine respondent associates. Many more Equine respondent practice owners (49.4 percent) reported that they were extremely satisfied with their employment than Equine associates (20.2 percent). Among AVMA respondents, 45.2 percent of owners were extremely satisfied versus 15.4 percent of associates. More than 40 percent of associate respondents in both the Equine and AVMA samples reported being not at all satisfied to moderately satisfied with their employment (Table 78).

More than one-third of Equine respondents have been with their current employer for less than five years, less than 20 percent for six to 10 years, and about 40 percent for more than 10 years (Figure 82). AAEP respondents were asked if they were likely to remain employed at their place of employment over the next five years. The majority of AAEP respondents reported that it was very to extremely likely that they would stay at their current job over the next five years (Male: 72.9 percent; Female: 66.3 percent) (Figure 83). A sizeable group of AAEP respondents, however, reported they are moderately likely to not at all likely to stay employed within the next five years at their current employment (Male: 25.7 percent; Female: 31.2 percent). When the likelihood of staying at their current job over the next five years is shown with respect to graduation year (Figure 84), 42.8 percent of AAEP respondents revealed that they are not at all likely to moderately likely to want to stay at their job if they entered the veterinary workforce within the last five years. The reality of equine practice (long work weeks, additional responsibility of emergency duty, low salaries compared to other sectors of practice) and educational indebtedness may be driving this dissatisfaction of newer graduates. However, it is notable that when Equine respondents were asked would they change to a different veterinary sector if they could, 83.3 percent indicated they would not (AVMA: 71.8 percent).

In both the Equine and AVMA sample, those who graduated more recently indicated that they preferred a larger workplace. The percentage of respondents who reported this preference increased in a linear fashion with decreasing level of experience (fewer years from graduation) (Figure 93). This finding may follow the Millennial preference for collaboration and teamwork. Having grown up in an environment that fosters teamwork, most Millennials like working in groups and highly prefer a sense of unity and collaboration over division and competition. They look for support and reassurance among their peers and are a highly social generation (Yingling, n.d.).

Retirement

At the time this survey was conducted, 60 Equine respondents (6.6 percent) and 152 AVMA respondents (6.0 percent) were retired. 72.9 percent of these Equine respondents retired in the past five years (Figure 95). Respondents were asked about retirement decisions. Both samples revealed that most respondents retired from clinical veterinary medicine on or around their anticipated timeframe. However, while 50.8 percent of Equine respondents retired on or around their anticipated timeframe (AVMA: 71.8 percent), 32.2 percent retired from clinical veterinary medicine earlier than anticipated (AVMA: 18.5 percent) (Table 83). The two highest ranking reasons for retiring early from equine clinical veterinary medicine were “improve work-life balance,” and “stress level” (Table 84).

Unemployment and Underemployment

In 2015, 2.4 percent of Equine respondents were unemployed in clinical veterinary medicine at some point in that year. Of the 2.4 percent respondents who reported unemployment, 35.3 percent of them found a job within one month, 29.4 percent found a job between three to six months after beginning a job search, and 35.3 percent found work within a year.

Underemployment is defined as the measure of a person’s desire and ability to increase one’s hours spent working. The desire and ability to increase one’s working hours is often unattainable due to a lack of demand for one’s services. In this survey, underemployment represents the number of additional hours that veterinarians desire to work above what they are currently working. Measured in total hours, underemployment reflects the increase or decrease in weekly hours that one wishes to work for an equivalent increase/decrease in compensation.

Among Equine respondents, 60 percent stated they would work the same number of hours per week as they are currently working with no change to their current level of total compensation (AVMA: 65.8 percent), 16.8 percent wished to work more hours per week than they do now, for a higher level of total compensation (AVMA: 12.0 percent), and 23.2 percent wished to work fewer hours per week for a lower level of total compensation (AVMA: 22.2 percent) (Figure 99).

By gender, 25.3 percent of female (AVMA: 23.9 percent) and 19.9 percent of male (AVMA: 18.6 percent) Equine respondents wished to work fewer hours for less compensation. In contrast, 16.5 percent of Equine sample females (AVMA: 12.5 percent) and 17.7 percent of Equine males (AVMA: 11.7 percent) wished to work more hours for greater compensation (Figure 100).

Of the Equine respondents who desired to work more hours, the mean number of additional hours desired was 19.7 hours (AVMA 18.9 hours). Reasons that Equine respondents gave for wanting to work more hours a week were the desire to gain professional expertise (14.7 percent), not currently working to capacity (42.2 percent), the desire to earn more compensation (82.6 percent), or other reasons such as paying off student loans, providing better service to the community, satisfying needs of the client, and social benefits (4.6 percent). The Equine respondents who desired to work fewer hours wanted to lessen their work week by 16.4 hours (AVMA: 14.9 hours) and cited the need to improve work-life balance as the main reason they want to work less (77.3 percent), followed by taking care of children/childbearing (Table 89).

How is the physical and mental health of equine practitioners?

The survey asked a number of questions relating to respondents' physical and mental health, history and severity of on the job injuries and chronic pain, and how respondents felt these factors affected their productivity.

Approximately 90 percent of AAEP respondents of both genders reported their physical health as good to excellent. Just over 90 percent of the male respondents reported their mental health as being in good to excellent condition, and 76.6 percent of the female respondents reported their mental health being in good to excellent condition. 9.2 percent of AAEP males and 18.7 percent of females reported their mental health to be in fair condition, and 0.7 percent of males and 4.6 percent of females reported their mental health as being in poor to very poor condition (Figure 118). Thus, nearly one-quarter of female AAEP respondents reported their mental health to be fair to very poor. The reasons for these disparities must first be viewed through the lens of the differing profiles of the respondents: males had an average age of 55 and an average of 29 years of experience versus females with an average age of 39 and an average of 12.3 years of experience. In addition, the burdens of high educational debt and low starting salaries borne by recent graduates, along with the stressful lifestyle of equine practice, are undoubtedly factors in decreased mental health.

AAEP male respondents reported more limitations on their daily activity from physical health than females, while females reported more limitations from mental health. Among the AAEP members surveyed, 43 percent of male respondents and 40 percent of females reported that their physical health limited them in some degree from meeting the demands of their job or daily life (Figure 123). Vigorous activity was limited more than moderate activity for both genders (Figure 127 and Figure 128). There was a general linear trend of activities, especially vigorous, being more limited in practitioners of advancing age, though most respondents with up to 50 years of experience reported that moderate activity was not limited at all by their health (Table 92).

Nearly one-quarter of AAEP males reported that their mental health limited them a little to a great deal in meeting the demands of their job or daily life, while 42.5 percent of AAEP females reported their mental health affected their ability to meet the demands of their job or daily life a little to a great deal. However, most respondents reported no limitation (Figure 123). AAEP graduates from the last 10 years reported higher levels of negative effects of their mental health on their work and accomplishments in the four weeks prior to the survey than other experience cohorts (Table 96).

Work Injuries

Nearly four-fifths of AAEP respondents reported they had been injured while performing work as a veterinarian. Of the respondents who reported work injuries that caused them to miss work, most (53.0 percent) reported two to four injuries over the course of their career (Figure 125). Out of the 764 respondents who were injured at some point during their career and who answered this question, 48.0 percent did not miss work due to a work injury for at least one of the injuries they reported having, 36.7 percent indicated no more than seven days of work were missed, 10.7 percent no more than 30 days, 4.7 percent no more than 90 days, and 3.4 percent more than 90 days. A small number (2.1 percent) indicated they sustained a permanent disability from an injury that occurred while practicing veterinary medicine (Figure 124). Slightly more than 16 percent of AAEP respondents reported being hospitalized and 20.3 percent reported having surgery for a work-related injury. Equine veterinarians commonly continue to work despite injuries. This may be related to the high numbers who are solo practitioners, who may feel they have no choice but to continue to produce revenue and provide services to their clients. Many multi-doctor practices have limited capacity to take on the work of an injured coworker without increasing the already robust average number of hours worked each week. Equine practitioners likely feel a strong responsibility to not only continue to care for their patients, but to not unduly burden their fellow veterinarians.

AAEP respondents were asked how much bodily pain they had experienced during the four weeks prior to completing the survey, as well as the degree to which pain had interfered with their normal work, including both their work outside the home and their chores in daily living.

While two-thirds of male and female AAEP respondents reported mild or very mild pain, 23.8 percent of males and 16.5 percent of females reported moderate pain, and 2.6 percent of males and 2.3 percent of females reported experiencing severe or very severe pain. About half said the pain did not interfere at all with normal work. Most of the rest reported a small amount of interference. A minority of respondents reported a lot of interference (Table 97). While equine practice is quite a physical career, and injuries are not uncommon, equine practitioners are clearly tough individuals, and persist despite chronic pain.

Professional Quality of Life (ProQOL) Measures

Professional Quality of Life (ProQOL) (Stamm, 2010). Questions were included in the *AVMA-AAEP 2016 Survey of Equine Practitioners* to investigate the effect that expending compassion during work as a veterinarian has on the practitioner's well-being. Responses to the ProQOL questions are scored based on the responses of thousands of individuals across many different occupations.

The ProQOL application is used to measure compassion satisfaction, burnout and secondary traumatic stress associated with helping others who have experienced suffering. Compassion satisfaction is about the pleasure someone derives from their work. An individual might, for example, feel like it is a pleasure to help others through the work that he or she does, and might feel positively about colleagues, or his or her ability to contribute to the work setting or the greater good of society by working with people who need care. On the other hand, negative feelings derived from work is measured by scoring burnout (exhaustion, frustration, anger, depression) and secondary traumatic stress (work-related mental trauma).

Mean compassion satisfaction scores for Equine respondents (Figure 131) were in the high-normal range, and Equine respondent scores for burnout (Figure 132) and secondary traumatic stress (Figure 133) were in the low-normal range. On average, Equine respondents had scores that were a bit better than the AVMA cohort (higher for compassion satisfaction and lower for burnout and secondary traumatic stress). A linear trend was seen for compassion satisfaction across graduation year cohorts with the older graduates reporting higher scores than recent

graduates (Table 99), and a linear trend was seen for burnout and secondary traumatic stress across graduation year cohorts with the older graduates reporting lower scores than recent graduates (Table 109 and Table 119). The mean sum of burnout scores was 2.2 points lower for Equine than AVMA, and in the low-normal (better) end of the results reported across all professions. However, 5.8 percent of Equine and 9.2 percent of AVMA respondents had burnout scores over 35, indicating the need of intervention (Figure 132). The data showed that females had higher burnout (Table 110) and secondary traumatic stress scores (Table 120), and lower compassion satisfaction scores than males (Table 100). Based on the demographics of the Equine cohort, this was not unexpected. Female practitioners are mostly those with fewer years of experience, have high educational debt, earn low salaries, and are less likely to be practice owners. The data showed that practice ownership, higher incomes, and increased years of experience were associated with better scores, and debt was associated with less positive scores.

The survey section on the veterinary market concluded with questions relating to well-being that were specific to the equine sector of veterinary medicine. The survey broke down respondent answer trends by gender. Questions relating to feeling satisfied when learning new information or skills, or noting a positive patient outcome tended to have similar positive ratings from male and female respondents. Questions relating to the level of stress felt while on call, or handling multiple priorities, or feeling exhausted or irritated while on the job tended to have different ratings between genders, with females indicating higher levels of stress, irritation or exhaustion than males (Table 129).

THE MARKET FOR VETERINARY SERVICES

The report on the market for veterinary services includes information on the supply of equids in the United States, private practice equine veterinary services, and the demand for equine veterinary services. Many factors drive the market for equine veterinary services. As the demand for veterinary services increases, the price of veterinary services increases in parallel, other things being equal. Conversely, a decline in the number of clients, animals per client, or services demanded per animal will typically reduce the demand for veterinary services and thus

the overall revenue of equine veterinary practices for service. In addition, there has been an increased shift of horse owners utilizing outside resources to provide some of these services through non-veterinary providers.

Data from the U.S. Department of Agriculture Census of Agriculture and the 2016 AVMA Pet Demographic Survey (PDS) demonstrate a downward trend of equine numbers in the country. The American Horse Council estimated 9.2 million equids in the United States in 2005. The American Horse Council Economic Impact Study released in early 2018 estimated the current U.S. equine population at 7.2 million. Conversely, the Brakke Equine Mega Study in 2014 reported an estimated U.S. horse population of 6 million, clearly demonstrating the uncertainty of current equine population numbers. The 2012 census by the USDA, PDS and American Horse Council may shed a more accurate light on what can best be described as a very volatile market place for the equine industry since the 2007 economic recession.

Horse-owning households surveyed by the AVMA Pet Demographic Survey reported that 65 percent of primary equine caretakers were female; of these households, 47 percent regarded their horses as family members, 42 percent as pets or companions and 11 percent as livestock or property. This demographic of horse owners' purchases of veterinary services is parallel to their disposable household income; almost half (44 percent) of horse-owning households surveyed by the AVMA Pet Demographic Survey reported that their horse(s) did not receive any care from a veterinarian in 2016, likely reflecting the direct relationship of disposable income to veterinary service demand. The remaining households surveyed had between one and more than four visits.

According to the 2012 AAEP Owner Trainer Survey, one of the top three reasons that clients choose a veterinarian is the ability to provide on-the-farm ambulatory emergency care 24 hours a day, seven days a week. Interestingly, less than 10 percent of the respondents chose low fees as a top reason to choose a veterinarian. More than half (55 percent) of the owners reported they had been using their primary veterinarian for at least six years; the average was nine years suggesting that market demand, while impacted by economics, remains fairly stable in professional services and the related relationships.

A PORTRAIT OF THE EQUINE VETERINARY PRACTICE

This section of the report examines the multiple sectors of equine veterinary practice, communication, ambulatory service calls, utilization of practice staff, competition from alternative service providers, practice ownership, practice revenue trends, motivation factors for becoming an equine veterinarian, and satisfaction with the equine veterinary career.

Sectors of equine practice

Equine veterinary practices have much in common with other types of veterinary practices in the delivery of veterinary medical services. Equine practices, however, have several characteristics that distinguish them from other types of practices, such as varying foci on individual equine subsectors within the equine industry. More than 60 percent of AAEP respondents at the time of the survey worked in general equine practice serving multiple sectors. These individuals typically work with many different types of horses in different equine sectors throughout the day. Of the remaining respondents, 15.6 percent worked in English performance, 5.7 percent worked in Thoroughbred racing, 5.7 percent worked in the reproductive sector, 4.7 percent worked primarily with equine companions, and the remainder (each under 4 percent) in gaited breeds, Quarter Horse and Standardbred racing, ranch or working, and Western performance (Figure 141).

Communication

Equine veterinarians communicate with multiple individuals about the diagnosis and treatment of an individual patient and do so in a variety of ways. Almost 70 percent of AAEP respondents most frequently contacted the owners of the patient. Next in the contact order were farm trainers (majority-ranked second) and farm employees (majority-ranked third) (Figure 144). Communication varied depending on the sector. Respondents in the racing industries interfaced with owners about a patient the least of all sectors. Most respondents in racing sectors serving Thoroughbreds (80.0 percent), Standardbreds (71.4 percent), and Quarter Horses (100.0 percent) utilized trainers and farm managers as the primary contact (Figure 144).

Respondents in the Quarter Horse racing industry communicated with trainers on average 97.0 percent of the time, and owners 10.6 percent of the time. In the Thoroughbred racing industry, respondents reported that they communicated 75 percent of the time with trainers and 22.9 percent of the time with owners. Respondents in the English performance sector indicated that they communicated with owners 58.2 percent and trainers 57.7 percent of the time (Table 134).

Over time, the equine veterinary industry has adopted new technologies and channels through which to communicate. While slightly more than half of the respondents ranked in-person communication first, cell phone communication was a close second (46.9 percent), followed by email and text messaging (Figure 145).

Full-Time Equivalent Veterinarians and Staff Support

In the AAEP sample, 38.5 percent of respondents reported a one-veterinarian practice, 14.3 percent a two-veterinarian practice, 12.6 percent a three-veterinarian practice, 7.8 percent a four-veterinarian practice, 6.1 percent a five-veterinarian practice, and 20.6 percent a six-or-more-veterinarian practice (Figure 146).

On average, there were 1.7 FTE support staff for every FTE veterinarian employed at the AAEP respondents' place of employment in 2015. About 25 percent of respondents reported two to four, an additional 25 percent reported five to nine positions at their practice in 2015, and 16 percent reported no support staff positions (Figure 147). A total of 72 solo practitioner respondents reported no support staff positions. Of the respondents reporting additional owner, associate and staff positions in their place of employment in 2015, the mean number of FTE associates per FTE owner veterinarian was 1.89, or about two associates for every owner in a practice (Table 136), and approximately one part-time staff position for each veterinarian in a practice. These positions included 0.37 interns, 0.57 credentialed veterinary technicians, 0.80 non-credentialed veterinary technicians, 0.80 veterinary assistants, 0.67 receptionist/information clerks, and 0.89 barn/hospital animal caretakers per veterinarian (Table 137).

Staff Utilization

More than one-third of AAEP respondents (35.2 percent) reported that veterinary technicians and/or other support staff were used routinely on ambulatory calls (Figure 148). Nearly half of the respondents indicated that support staff were not used after business hours (Figure 149), compared to almost one-quarter of respondents who said support staff were used after normal business hours on ambulatory calls, but only if needed.

Among AAEP respondent practices, more non-licensed technicians were used than licensed technicians at the respondents' place of employment. 55.7 percent of AAEP respondents reported that they did not have a licensed technician in the workplace, compared to 21.5 percent who said they did not have a non-licensed technician/veterinary assistant in the workplace. This finding may be because licensed veterinary technicians with equine experience could be more difficult to find than non-licensed assistants, as the curriculum for veterinary technology is heavily concentrated on companion animal skills, and employment opportunities and salaries in companion animal practice are often more attractive than those in equine practice.

Primary Business Model

Among AAEP respondents, 36.5 percent reported being in an ambulatory practice. The distribution also included: 35.4 percent ambulatory with a haul-in facility; 16.1 percent full-service specialty/referral hospital with an ambulatory division; 1.3 percent haul-in facility; and 1.7 percent full-service specialty/referral hospital with no ambulatory division (Figure 152).

More than 90 percent of AAEP respondents said they charged a farm call or trip fee, and nearly the same amount (89.4 percent) reported that they charged an emergency fee in addition to a trip charge for emergency calls. A modest number of respondents (4.9 percent) said they did not offer emergency services.

The majority (77.4 percent) of AAEP respondents reported a service area radius of between zero and 60 miles, with the remainder of respondents (22.6 percent) covering more than 61

miles (Figure 153). Almost half (47 percent) of AAEP respondents reported that they drove between 25,001 and 50,000 miles annually while practicing veterinary medicine as an equine practitioner, followed by 29 percent who traveled between 12,501 and 25,000 miles a year (Figure 154).

Parallel Service Providers and Competition

There are many non-veterinarian providers of equine services – including dentistry, podiatry, sports medicine, integrative therapies, reproduction, and pharmaceutical services – that were once deemed solely the market of veterinarians. These non-veterinarian providers of equine services can be referred to as parallel service providers. The top services that AAEP respondents believed affected their revenue stream were dentistry (62.5 percent), internet pharmacy sales (54.7 percent), lay practitioners performing chiropractic, acupuncture and massage services (47.1 percent), transient show veterinarians who followed a show circuit (31.2 percent) and traveling pharmacies with a physical presence at horse shows (16.6 percent) (Figure 155).

AAEP respondents face competition not only from parallel service providers but from other veterinarians within their service areas as well: 26.5 percent of AAEP respondents stated that there were one to five other equine veterinarians in their service area, followed by 24.6 percent with six to 10 veterinarians, 23.6 percent with 11 to 20 veterinarians, 11.6 percent with 21 to 30 veterinarians and 13.7 percent with 31 or more veterinarians (Figure 157).

Practice Ownership and Ownership Transitions

Practice owners accounted for 334 (34.3 percent) of the Equine respondents who revealed their employment status at the end of 2015. Of the respondents who were practice owners, 49.7 percent were sole proprietors, 36.5 percent were a partner/shareholder in an S-Corp or C-Corp, and 13.8 percent were a partner in a Limited Liability Corporation (LLC) or other type of practice ownership structure (Figure 159).

Of the 225 AAEP respondents who shared their perspective on selling ownership shares, 4 percent indicated that they would like to sell some or all of their shares before retirement, 28.4

percent would like to sell at the time of retirement, and 67.6 percent indicated selling shares both before and at the time of retirement. In the AAEP sample, more than half (50.4 percent) of relief and associate veterinarian respondents were interested in purchasing a practice; this number is more than twice the interest reported by the AVMA sample (21.7 percent).

Although owners wish to sell and associates wish to buy, more than 64 percent of AAEP respondents were not very confident, to not at all confident, or unsure about obtaining practice ownership. More than half (56 percent) of AAEP respondent owners stated they were not very confident, not at all confident, or not sure about being able to successfully sell their ownership interest (Figure 162). An assessment of the confidence level of owners in selling interest in their practice with respect to their practice size indicated that owners were more confident in selling their ownership interest if they had more staff members in their practice (Figure 163).

In considering who would buy their practice interest, 36.7 percent of AAEP respondent owners were not sure who might succeed them, 26.9 percent indicated that they were looking to current associates to purchase the practice, followed by nearly the same number of respondents (26.6 percent) who cited a veterinarian not currently working at their practice as a future successor. Of the remainder, 7.9 percent of AAEP respondents had some other person in mind, and 2 percent of respondents reported that a corporate entity was most likely to purchase their ownership interest (Figure 165).

Only 18.4 percent of respondents reported having a buy-sell agreement in place to provide structure for departure of partners due to retirement, disability, or death.

Compensation Methods

Data showed that 39.2 percent of AAEP respondent owners were compensated with no differentiation between pay for effort as a veterinarian and pay as an owner (Table 149). Because practices are valued based on their profitability, when owners' pay for being a veterinarian is not separated from their return on investment as a business owner, true profitability is not readily visible on financial reports. The compensation model recommended by business consultants includes pay for each of these aspects of ownership: effort as a

veterinarian, effort as a practice manager, return on real estate, and return on ownership investment. Thus, an owner is paid for their effort as a veterinarian with the same formula as any other veterinarian employed by the practice. For practice management, a budget of 1 to 3 percent of gross revenue is set aside each year for all expenses related to practice management, such as an office manager's salary and benefits, membership in a management study group, or education in management. The remainder is split among owners as a stipend for management duties, paid in proportion to their efforts in this area. For practice owners with real estate ownership shares of a practice facility, return from lease payments is a third component of compensation. Lastly, the net profit of the practice is split among owners in accordance with their proportion of ownership or contribution to production of revenue.

For AAEP respondent associates, 49.3 percent reported that they were on a salary with opportunity for production-based compensation, followed by 29.5 percent who were paid salary only (Table 149). 68 percent of associate veterinarian respondents reported they preferred a mix of base salary with the opportunity for additional production-based compensation, followed by 21.2 percent that preferred straight salary (Figure 166).

Those AAEP respondents, both owners and associates, who were paid based on revenue production, (46.3 percent and 62.4 percent, respectively) were asked to indicate how the compensation was calculated: 14.6 percent of owners and 22.9 percent of associates were compensated based on a consistent percentage of gross production/sales revenue for all services, medical supplies, and pharmaceuticals; among associate respondents, 24.3 percent reported that compensation was derived from a higher percentage of gross production/sales revenue for services and a lower percentage of sales of medical supplies and pharmaceuticals. Less than 10 percent of either group of respondents was paid on net production, or a variable commission rate depending on the nature of the services performed (Table 154). Of the AAEP respondents who had practice management duties, 340 (64.4 percent) reported that they did not receive compensation for these services.

Percentage of Household Income

When asked what percentage of household income was contributed by the respondent, 65.4 percent of male AAEP respondents reported that they contributed 76 percent to 100 percent toward their total household income, compared to 42.2 percent of female AAEP respondents (Figure 168). This is not surprising considering the increase in dual career couples in the last several decades, and the fact that the median age of Equine male respondents was 58 years, compared to 35 years for females.

Gross Revenue Production

The median personal gross revenue from production for Equine practice owner respondents was \$385,832, and for associates was \$356,500. For AVMA respondents, the median personal gross revenue from production was \$500,000 for owners and \$450,000 for associates (Table 156).

The mean personal gross revenue of production among Equine respondents by graduation year showed a gradual increase in revenue production until after 20 years of practicing veterinary medicine was reached. Respondents less than five years after graduation reported mean gross revenue production of \$306,019, while respondents who had been practicing for more than 30 years produced a mean of \$411,528. AVMA respondents showed similar means with respect to respondents who recently graduated bringing in less revenue than those with more experience (Table 157).

The mean personal gross revenue from production among Equine respondents by gender was \$477,929 for males, and \$346,638 for females. Among AVMA respondents, the mean personal gross revenue was \$515,159 for males and \$451,108 for females (Table 158). The distribution of personal gross revenue from production by gender is presented in Figure 174. It is important to note when interpreting this data that the mean experience (years since graduation) of male respondents (29 years) in this study was more than twice that of females (12.3 years).

The higher the median personal gross revenue of production reported by Equine and AVMA respondents, the higher the income bracket a respondent reported (Table 159). Overall, Equine or AVMA respondents who brought more revenue into the practice reported higher trends in personal take-home income (Figure 175).

Respondents' median personal gross revenue from production, in general, consistently increased as the number of veterinarians in a practice increased until reaching a three-FTE veterinarian practice. AAEP respondents in a one-veterinarian practice with no support staff reported producing a median of \$205,000 in gross revenue. Those in a one-veterinarian practice with support staff produced a median of \$330,000 and those in a veterinary practice of two FTE veterinarians produced a median of \$400,000 (Table 160). The general trend among AAEP respondents was that the larger the practice size, the higher the number of respondents who produced revenue of more than \$300,000 (Figure 176). A greater percent of respondents from five- and six-doctor practices earned revenue of more than \$500,000 than did those from four-doctor and smaller practices.

Revenue and Income Contraction and Expansion of Equine Practices

AAEP respondents who were practice owners were asked specifically about whether their practices' gross revenue production expanded (increased) or contracted (decreased) in 2015 compared to 2014. Overall, 64.1 percent of owner respondents reported an expansion in practice gross revenue in 2015 compared to 2014; 13.1 percent reported a contraction, 16.6 percent of respondents reported that their revenue stayed the same, and 6.3 percent were unsure.

Expenses

The survey responses indicated that, in general, the more veterinarians there were in a practice, the lower the practice expenses and deductions per veterinarian (at the median) (Table 164).

The current ratio (current assets to current liabilities) is a measure of the practice's ability to meet short-term obligations. The median current ratio of AAEP owner respondent's equine practices was 5.74, with a range of less than .01 to 61.6. These data mean that the median veterinary practice has \$5.67 of current assets for each \$1 of current liabilities. Minimal acceptable current ratios vary from industry to industry and are generally between 1.5 and 3 for healthy businesses (The University of Adelaide, 2014; Gallo, 2015).

Profit Centers/Activity Centers

Multiple different activities in equine practice are revenue generators for veterinarians. The highest mean percent of revenue for AAEP respondents was reported to be preventative medicine (14.8 percent), followed by pharmacy sales (11.2 percent), lameness examinations (10.5 percent), imaging (9.9 percent), physical examinations (9.0 percent), dentistry (8.4 percent), and laboratory testing (7.0 percent). Farm calls accounted for an average 6.8 percent of revenue, internal medicine contributed 5.9 percent, and reproductive services 5.1 percent. Integrative therapies made up a mean of 4.4 percent of revenues, while the smallest sources of revenue reported were for surgery (4.2 percent) and pre-purchase exams (2.9 percent) (Table 172).

ECONOMIC IMPACTS OF THE EQUINE VETERINARY INDUSTRY

Economic impact analysis (EIA) provides a comprehensive assessment of the economic impacts of the profession on the U.S. economy. The objective of the EIA in this report is to determine the economy-wide impacts of equine veterinary industry activities at the regional and national levels. The report presents a look at the direct, indirect, induced, and total effects of veterinary practices on the economies of each of the U.S. regions defined by the U.S. Postal Service.

IMPLAN software is the economic tool that is most widely used for economic analysis. The IMPLAN system combines data from different sources including the U. S. Department of Commerce, the U.S. Bureau of Labor Statistics, and other Federal and state government agencies to compute multipliers that are used to estimate the impacts of outside factors on the

local economy. Data in IMPLAN are collected for every geographic region in the United States, from small cities to the entire nation. The IMPLAN system estimates the multiplier effects of changes in final demand for one sector on all other industries within a local area and provides the results in terms of total changes in employment, income, output and value added.

In an economic impact analysis, three different results are presented: direct effects, indirect effects and induced effects. Putting the results in the context of an equine veterinary practice, the direct effect refers to the impacts created directly by the practice's activity. This translates into an increase in the total gross output of all businesses in the community and the creation of jobs. The indirect effect refers to those effects generated by the producers of intermediate goods and services purchased. Industries affected by veterinary practice and part of the indirect effect may include utilities, construction, landscaping, delivery services and other businesses that provide services to the practice. The induced effect refers to the subsequent spending in the local economy made by the employees of equine veterinary practice and those of the intermediate input suppliers.

An economic impact analysis was performed for each of the 10 regions in the United States utilizing an approximate number of equine veterinarians and employees, the mean practice revenue of each region and an assumption that the production of a veterinary service by any of these regions required the same set of inputs. Once the impact per practice was determined, the impact for the entire industry was aggregated by multiplying the impact of an individual practice by the total number of establishments in the region.

The employment effects indicated that at the national level the equine veterinary industry generates an estimated 18,658 direct jobs, supports 5,497 indirect jobs, and induces 8,925 other jobs for an estimated total of 33,080 jobs for the entire economy (Table 175). The total direct economic impact on labor income (employment) at a national level was estimated at \$1.14 billion. The total indirect effects were estimated at \$301 million and the induced effects at the national level were equivalent to \$432 million. The aggregated effects were estimated at \$1,875 billion for the U.S. economy (Table 176).

The value added represents the increase in the gross revenue of production generated by an industry. The direct contributions of equine practice to the gross revenue of production by region varied, but at the national level the direct effects were estimated at \$2.7 billion. The total indirect effects were estimated at \$538 million and the induced effects at the national level were equivalent to \$761 million. The aggregated effects were estimated at \$3.97 billion for the U.S. economy (Table 177).

The total dollar value of the equine veterinary services sold to consumers by equine veterinary practices was estimated at \$3.55 billion. The total indirect and induced effects at the national level were \$944 million and \$1.31 billion respectively. The aggregated effect for the entire economy was estimated at nearly \$5.81 billion (Table 178).

Equine veterinary practices pay tax to the local, state and Federal governments through different channels for a total of an estimated \$700 million. The Federal government received \$144 million on employee compensation, \$20 million on production and imports, \$143 million on household service expenditures, \$137 million for corporate earnings and an estimated \$26 million as tax on proprietor income (Table 180).

On state and local levels (combined), taxes totaled \$2.5 million for payroll, \$160 million on production and imports, \$48 million on household service expenditures, \$19.3 million on corporate earnings and \$26.5 million on proprietor income (Table 179).

In conclusion, equine veterinary practice, although a small slice of veterinary medicine as a whole, has a significant impact on regional and national economies and merits solid consideration in government, industry and stakeholder discussions.