

# Demographics, measures of professional achievement, and gender differences for diplomates of the American College of Veterinary Surgeons in 2015

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## OBJECTIVE

To characterize elements of employment, professional success, and personal life for American College of Veterinary Surgeons (ACVS) diplomates and identify elements of practice that may serve as barriers to work-life balance or affect men and women differently.

## SAMPLE

836 ACVS diplomates.

## PROCEDURES

An 81-item questionnaire was sent to 1,450 ACVS diplomates in 2015 via email and conducted by means of an online platform. Responses were analyzed to identify associations among selected variables.

## RESULTS

The survey response rate was 58% (836/1,450). The median age category among respondents was 41 to 45 years. The ratio of male to female diplomates was equivalent among those < 40 years old. Respondents in small animal private practice worked the fewest number of hours; those in equine or large animal private practice worked the most and had the most on-call responsibility. Women were more likely than men to be employed in academia. In both private practice and academia, respondents in small animal practice earned more than did those in equine or large animal practice, and women earned less than did men, even after adjustment for relevant covariates. Women were less likely than men to be practice owners or to hold a prestigious academic title and rank. Perceptions about the effect of gender in the workplace differed between men and women.

## CONCLUSIONS AND CLINICAL RELEVANCE

Findings suggested that the veterinary surgical profession is demanding for both genders, although increased flexibility in certain areas may improve work-life balance. (*J Am Vet Med Assoc* 2019;255:1270–1282)

**S**urgery can be a lucrative field for veterinarians, but the specialty can also be demanding and stressful. Although surgical principles may not differ among species or practice types, related daily activities and career outcomes and achievements may differ greatly among veterinary surgeons. Specific and practical information about surgeons' experiences may be helpful for veterinarians considering a career in surgery, negotiating contracts, and considering career modifications as well as for practice managers and academic administrators seeking ways to improve work environments.

Definitive measures of success for veterinary surgeons may differ between those in academic versus private practice settings. Income is a quantitative measure of prosperity in both settings; other measures of achievement, such as promotion, selection for more prestigious administrative roles, and practice owner-

ship or partnership may be more qualitative forms of assessment. We have observed a trend at our own institution toward applicants completing 2 or more internships prior to successfully matching into surgical residency programs; as a result, it appears that many veterinary surgeons will be  $\geq 30$  years old by the time they accept their first job. This statistic suggests at least 8 years of foregone income, compared with the income that might have been received had employment been secured immediately following an undergraduate education, and this loss is substantial when compounded with the heavy debt many new veterinarians may carry. These stresses may persist through the first 15 to 20 years of practice, given that salary can be dependent on generation of revenue and practice ownership requires considerable reinvestment of capital. In academia, promotion and advancement follow a similar timeline, and productivity often requires a substantial time investment outside of typical working hours. The intersecting burdens of time versus success and productivity are challenging for men and women seeking balanced involvement with family, community, or interests outside of work.

## ABBREVIATIONS

ACVS	American College of Veterinary Surgeons
CI	Confidence interval
STEM	Science, technology, engineering, and mathematics

Coinciding with changes in government policy such as the President's Commission on the Status of Women (1961), Equal Pay Act (1963), and Executive Order 11375 (1967) banning sex discrimination in hiring and employment, the percentage of women entering the workforce in the United States has increased dramatically, from 38% in 1963 to 58% in 2012.<sup>1</sup> Work-life balance and gender-related concerns have been evaluated among surgeons in various subspecialties in human medicine.<sup>2-6</sup> Some research has identified income inequality between male and female physicians, with men consistently being compensated at a higher rate than women.<sup>7</sup> Other research has shown that women fail to advance into prestigious positions at the same rate as men, highlighting the continued existence of the so-called glass-ceiling phenomenon.<sup>8,9</sup> Finally, there is evidence of discrepancies between how men and women recognize and interpret the effect of gender on opportunities for promotion, salary, and workplace dynamics and how these perceptions may influence outcomes.<sup>10</sup> To our knowledge, no similar studies have been conducted in the field of veterinary surgery.

In 2015, 63% of the approximately 1,850 ACVS diplomates were male.<sup>11</sup> In contrast, our informal analysis of data from the Veterinary Internship and Residency Matching Program results showed that 37% of individuals who matched into surgical residencies between 2011 and 2015 were men, whereas 63% were women. Enrollment in US veterinary medical colleges has been predominantly (> 50%) female since the late 1980s, and since 2005,  $\geq 75\%$  of students have been female.<sup>12</sup> Since 2009, AVMA surveys have shown that female veterinarians outnumber male veterinarians, and this predominance has continued to grow steadily on an annual basis.<sup>13</sup> Given these statistics, it is almost certain that the field of veterinary surgery will experience a shift in workforce demographics in the near future.

An objective summary of the current landscape of careers available in veterinary surgery does not currently exist. The challenges both genders face in balancing a successful career in veterinary surgery with adequate personal time, and those that women, specifically, may face professionally, have not been elucidated, and formal discussion of this topic has been limited. In addition, the effects that specific cofactors such as practice type, large versus small animal focus, number of hours worked, amount of on-call responsibility, geographic location, and gender, among others, have on measures of achievement are largely unknown. If identifiable differences exist between men and women in the professional realm, it is likely that a shifting gender demographic in the field of veterinary surgery will affect the future of practice. For the surgical specialty to remain attractive and lucrative for aspiring veterinarians, it is possible that practice culture may need to adjust to meet the changing needs and wants of the veterinary profession.

The objective of the study reported here was to gather data through an anonymous survey from a representative portion of ACVS diplomates with respect to clinical practice characteristics (eg, practice setting, number of hours worked, and compensation), measures of professional success (eg, economic factors and academic advancement), and elements of personal life (eg, marriage and children; summarized in another report<sup>14</sup>). Our aims were to analyze these data with adjustment for relevant covariates to estimate what may be expected for a veterinary surgeon (ie, an ACVS diplomate) and to identify specific factors that may contribute to, or inhibit, a successful career.

## Materials and Methods

### Study population

The study population from which participants were recruited comprised 1,450 ACVS diplomates who were in good standing as of February 2015. These 1,450 diplomates represented those among the 1,850 registered ACVS diplomates<sup>3</sup> whose email addresses could be obtained from the ACVS diplomate directory, via publicly accessible websites (ie, websites for practices or universities), or through personal contact. The Institutional Review Board at the University of Wisconsin-Madison waived formal review of the protocol owing to the nature of the study in accordance with federal regulation 45 CFR 46.102(d).

### Survey

An 81-item questionnaire (**Supplementary Appendix S1**, available at [avmajournals.avma.org/doi/suppl/10.2460/javma.255.11.1270](http://avmajournals.avma.org/doi/suppl/10.2460/javma.255.11.1270)) was designed to collect objective data about respondent demographics (eg, age category [25 to 30, 31 to 35, 36 to 40, 41 to 45, 46 to 50, 51 to 55, 56 to 60, 61 to 65, 66 to 70, and  $\geq 71$  years], gender, region of residence [Midwest, Northeast, Southeast, Southwest, West, Hawaii, Alaska, or Puerto Rico], and race or ethnicity), professional information (eg, practice type, rank or title, number of hours worked, and on-call duty), compensation (eg, personal income and household income), and personal and family information (eg, marital status, number and age of any children, childcare arrangements, and age at first child). Respondents were also asked to provide subjective data regarding their perceptions of the reciprocal effects of career and family and the effect of gender on elements of their professional life. An initial version of the survey was distributed to 20 faculty members at the University of Wisconsin School of Veterinary Medicine who were veterinarians but not ACVS diplomates. Responses were not formally collected, but feedback was solicited and incorporated into the final version of the survey to optimize the phrasing and clarity of questions and variety of response options as well as to identify and remove any perceived areas of bias.

The survey was administered by means of an online survey platform<sup>a</sup> to which a link was dis-

seminated via email with an introduction explaining the purpose of the survey (**Supplementary Appendix S2**, available at [avmajournals.avma.org/doi/suppl/10.2460/javma.255.11.1270](https://avmajournals.avma.org/doi/suppl/10.2460/javma.255.11.1270)). Access to the survey was provided for 1 month, during which emails were sent to the entire study population at weekly intervals to encourage participation. Responses were anonymous. All entered data were automatically transferred into a computerized database for analysis.

### Statistical analysis

Statistical software<sup>b</sup> was used for analyses. Response counts and percentages (for nonmissing responses) were calculated. For simple (univariate) comparisons involving categorical responses, the  $\chi^2$  test was used. Logistic regression was used to determine whether a trend existed in proportion of males by age category midpoints. For other simple comparisons involving age category or other categorized numeric variables (eg, hours or number of nights worked), linear regression was performed, with the midpoints of the categories (eg, for age: 28, 33, 38, 43, 48, 53, 58, 63, 68, and 73 years) treated as continuous data and used as the dependent variable. For simple comparisons involving personal income, for which the maximum possible response was \$300,000 (resulting in right censoring of responses), the Wilcoxon rank sum or Kruskal-Wallis test was used. For analyses involving academic title (academic promotion stage or rank and track), promotion stage or rank was scored as follows (smaller score representing a higher stage or rank): 1 = dean or associate dean, 2 = full professor (tenured), 3 = full professor (clinical), 4 = associate professor (tenured), 5 = associate professor (clinical), 6 = assistant professor (tenured), 7 = assistant professor (clinical), 8 = instructor, and 9 = other administrative role.

For multivariate comparisons involving personal income, parametric survival analysis with a Weibull distribution assumption (to account for the right censoring) and adjustments for covariates was performed. These covariates included gender, age, race or ethnicity, region, employment status, year of diplomate status achievement (ie, diplomate year), species specialty (ie, small or large animal [including equine] surgery), academic title or private practice ownership score, and number of additional academic degrees earned; models were also fit with interaction terms for gender with each other covariate. Single imputation of covariates (involving medians for numeric values and medians of midpoints for categorized numeric values) was used whenever information was missing on age, diplomate year, academic title or private practice ownership score, or number of additional academic degrees earned; all results were confirmed through a complete-case analysis (without imputation; ie, only survey response records with no missing data were used). Values of  $P < 0.05$  were considered significant for all analyses.

## Results

### Respondents

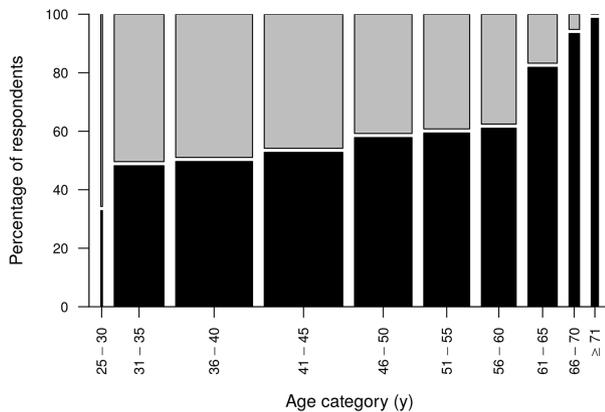
Overall, 1,450 ACVS diplomates were contacted via an active email account (ie, excluding email accounts that generated a delivery failure message) and invited to participate. Among those potential participants, 517 (36%) were identified as female and 933 (64%) were identified as male as indicated by ACVS diplomate directory information; 497 (34%) were listed in the ACVS directory as large animal surgeons, and 953 (66%) were listed as small animal surgeons. These proportions (gender and species specialty) were within 1% to 2% of statistics for the ACVS as identified through a census study<sup>15</sup> performed in 2012. Of the 1,450 diplomates contacted, 836 (58%) completed the survey via the online platform, and these respondents were included in the study. Not all respondents answered all questions, so denominators in percentage calculations differed among assessed variables.

### Personal demographics

Forty-one percent (294/712) of respondents identified as female and the remaining 59% (418/712) as male (ie, none as “other”). On the basis of the available data for all contacted diplomates, women were significantly ( $P < 0.001$ ) more likely to respond than were men (57% [294/517] vs 45% [418/933], respectively). Of respondents providing their race or ethnicity, most (92% [656/711]) identified as white, with small numbers identifying as Hispanic or Latino (4% [27/711]), Asian or Pacific Islander (2% [13/711]), black or African American (1% [7/711]), Native American or American Indian (< 1% [1/711]), or “other” (1% [7/711]).

The median age category was 41 to 45 years; 20% (143/710) of diplomates were within this age range at the time of the survey. Overall, men were older than women ( $P < 0.001$ ). Among respondents  $\leq 40$  years old, no difference was observed between the proportions of women and men (50% [117/232] vs 50% [115/232], respectively;  $P = 0.90$ ); among respondents  $\geq 41$  years old, the proportion of men was significantly ( $P < 0.001$ ) greater than the proportion of women (63% [301/477] vs 37% [176/477], respectively), and this difference in proportions increased with age ( $P < 0.001$ ; **Figure 1**).

Most (84% [598/713]) respondents resided in the United States, followed by Canada (6% [46/713]), Europe (5% [39/713]), Australia or New Zealand (4% [25/713]), Asia (< 1% [3/713]), and Central America (< 1% [2/713]). Among respondents living in the United States, 27% (160/592) indicated living in the Southeast, 24% (143/592) in the West, 19% (114/592) in the Midwest, 19% (112/592) in the Northeast, 10% (61/592) in the Southwest, and < 1% (2/592) in Hawaii, Alaska, or Puerto Rico (Supplementary Appendix 1).



**Figure 1**—Mosaic plot showing the distribution of males (black bars;  $n = 416$ ) and females (gray bars; 293) by age category for ACVS diplomates who responded to a survey regarding work-life balance. The area of each bar is proportional to number of respondents in that category.

### Professional demographics

Ninety-one percent (739/815) of respondents indicated that they were employed on a full-time basis and 6% (51/815) on a part-time basis; 3% (25/815) were unemployed. No significant ( $P = 0.90$ ) difference was identified between genders in employment status. Overall, 91% (737/814) of respondents indicated that they were currently practicing clinical veterinary surgery. Sixty-three percent (512/819) completed residency training in small animal surgery and 37% (307/819) in large animal surgery. At the time of the survey, 92% (748/817) of respondents indicated that they were practicing surgery on the same types of species (large animal [including equine] or small animal) for which they had received specialty training; only 2% (20/817) of those trained in large animal surgery had switched to practicing on small animals, and < 1% (3/817) had switched from small to large animal practice.

Significantly ( $P < 0.001$ ) different proportions of diplomates practicing small animal surgery (92% [485/527]) and large animal surgery (76% [213/282]) reported that performing surgery (rather than general care, ambulatory work, or other focuses of practice) was their primary area of responsibility. The median year when respondents achieved ACVS diplomate status was 2003, and the median number of jobs held since completion of residency was 2. In addition to a veterinary degree, 44% (302/681) of respondents possessed an MS degree, 12% (81/681) a PhD, < 1% (4/681) an MBA, and < 1% (2/681) a JD (doctorate of jurisprudence).

Overall, 61% (496/812) of respondents were in private practice, 34% (275/812) in academia, < 1% (6/812) in industry, and < 1% (3/812) in the military; for the 4% (32/812) who indicated “other” as the practice type, narrative responses included mixed practice, military service, administration, teaching, business management, specialty change, career change, and retirement. Most (70% [368/529]) respondents

practicing small animal surgery at the time of the survey indicated that they were employed in private practice, followed by academia (26% [129/505]). Among those practicing large animal surgery, similar proportions reported working in private practice versus academia (45% [128/282] vs 49% [138/282], respectively). Large animal surgeons were more likely than small animal surgeons to be employed in academia (49% [138/282] vs 26% [137/529], respectively;  $P < 0.001$ ).

The number of male and female respondents employed as small animal or large animal surgeons in private or academic practice was summarized (**Table 1**). Female surgeons were more likely than male surgeons to be employed in academia ( $P = 0.03$ ). Most (60% [288/477]) respondents working in private practice worked as solo surgeons (38% [182/477]) or with 1 other diplomate (22% [106/477]). Overall, large animal surgeons worked in practices with fewer ACVS diplomates than did small animal surgeons ( $P < 0.001$ ). In small animal private practice, 32% (115/355) of respondents indicated they were the only ACVS diplomate in their practice, and 22% (79/355) were 1 of 2 surgeons. On the other hand, in large animal private practice, 55% (67/122) were solo surgeons and 22% (27/122) were 1 of 2 ACVS diplomates. There was no difference ( $P = 0.45$ ) in the number of ACVS diplomates per practice by gender.

Responses regarding categories for mean number of hours worked per week and mean number of on-call shifts covered per month were summarized by practice type (private practice or academic) and by species specialty (small animal or large animal; **Tables 2 and 3**). Small animal surgeons employed in private practice reported working significantly ( $P < 0.001$ ) fewer hours than did those employed in academia; the median category of number of hours worked per week in private practice was 40 to 49 hours, compared with 50 to 59 hours in academia. Large animal surgeons did not differ in mean number of hours worked between the 2 employment settings; the median category of number of hours worked per week was 50 to 59 for both settings ( $P = 0.95$ ).

No consistent difference ( $P = 0.26$ ) was observed between genders in the number of hours worked across practice types and by species specialty. In private practice, the median category for mean number of hours worked was greater for men (50 to 59 h/wk) versus women (40 to 49 h/wk), but this difference was not significant ( $P = 0.62$ ). The median category for the typical number of nights spent on call per month for small animal surgeons was 4 to 7, with no significant ( $P = 0.52$ ) difference between those in private practice and academia. For large animal surgeons, the median categories for number of nights spent on call per month were 4 to 7 in academia and 15 or more in private practice ( $P < 0.001$ ). The median category for women was 7 to 10 nights of on-call duty/mo, compared with 4 to 7 nights/mo for men ( $P = 0.28$ ).

**Table 1**—Number (%\*) of male (n = 401) and female (276) ACVS diplomates practicing small animal or large animal (including equine) surgery in academia or private practice who responded to a survey regarding work-life balance.

Gender	Small animal			Large animal		
	Private practice (n = 327)	Academia (n = 116)	Overall (n = 443)	Private practice (n = 109)	Academia (n = 125)	Overall (n = 234)
Male	200 (61)	60 (52)	260 (59)	73 (67)	68 (54)	141 (60)
Female	127 (39)	56 (48)	183 (41)	36 (33)	57 (46)	93 (40)

\*The reported percentage represents the proportion within the indicated specific employment setting that was male or female.

**Table 2**—Distribution of hours worked per week as reported by the respondents of Table 1.

Hours worked	Small animal		Large animal	
	Private practice (n = 355)	Academia (n = 132)	Private practice (n = 122)	Academia (n = 134)
< 40	64 (18)	3 (2)	10 (8)	9 (7)
40–49	130 (37)	27 (20)	28 (23)	31 (23)
50–59	118 (33)	61 (46)	46 (38)	55 (41)
≥ 60	43 (12)	41 (31)	38 (31)	39 (29)

Data represent number (%) of respondents within the indicated specific employment setting.

**Table 3**—Distribution of the mean number of on-call shifts worked per month as reported by the respondents of Table 1.

No. of shifts	Small animal		Large animal	
	Private practice (n = 353)	Academia (n = 131)	Private practice (n = 121)	Academia (n = 131)
0	100 (28)	26 (20)	15 (12)	26 (26)
1–3	37 (10)	13 (10)	5 (4)	22 (17)
4–7	62 (18)	24 (18)	16 (13)	23 (18)
7–10	53 (15)	26 (20)	12 (10)	26 (20)
10–14	39 (11)	30 (23)	11 (9)	22 (17)
≥ 15	62 (18)	12 (9)	62 (51)	12 (9)

See Table 2 for key.

**Table 4**—Median income (X \$1,000) and proportion (%) of ACVS diplomates reporting incomes ≥ \$300,000 (\$300K) for the respondents of Table 1, by gender, species specialty (small animal or large animal [including equine]), and practice type.

Gender	Small animal (n = 481)				Large animal (n = 248)			
	Private practice (n = 354)		Academia (n = 127)		Private practice (n = 119)		Academia (n = 129)	
	Median income	Proportion (%) ≥ \$300K	Median income	Proportion (%) ≥ \$300K	Median income	Proportion (%) ≥ \$300K	Median income	Proportion (%) ≥ \$300K
Male	251	71/195 (36)	145	0/59 (0)	151	12/72 (17)	125	0/63 (0)
Female	192	18/122 (15)	120	1/56 (2)	110	2/34 (6)	108	0/56 (0)
Overall*	228	97/354 (28)	130	1/127 (1)	130	17/119 (14)	113	0/129 (0)

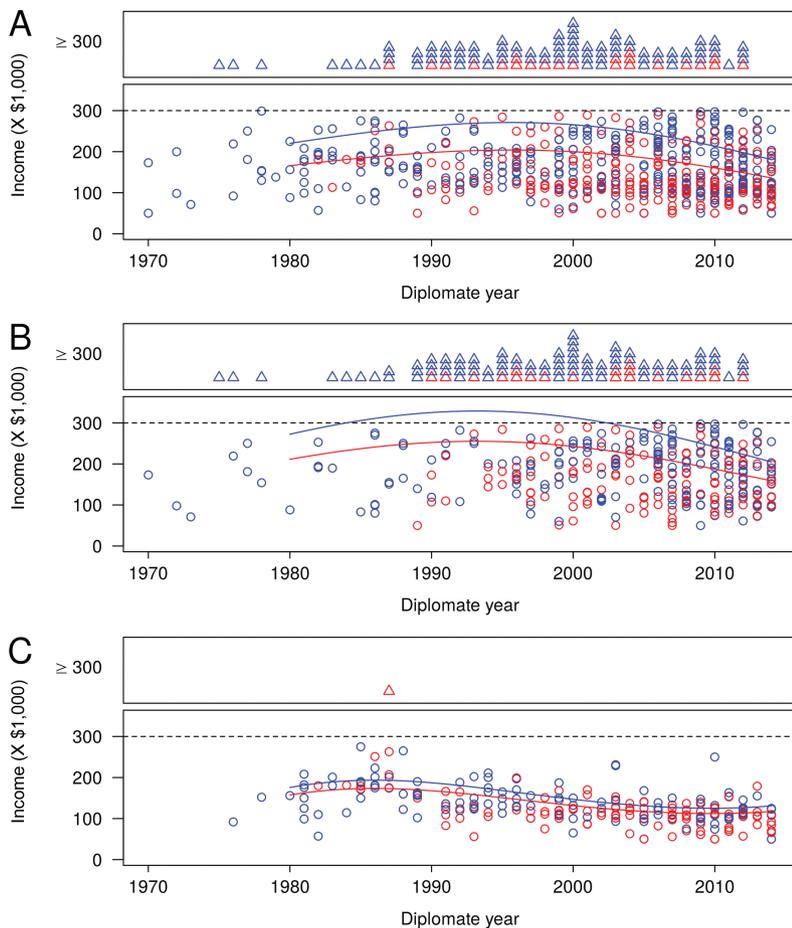
\*Numbers in the overall category reflect all those who responded to questions regarding personal income and practice type.

Because not all respondents answered all questions, the total number of male and female respondents does not equal the number of respondents in the overall category.

### Measures of professional success

Responses regarding personal annual income were summarized (**Table 4; Figure 2**). Surgeons working in private practice had a significantly ( $P < 0.001$ ) higher median income (\$206,000) than did those in academia

(\$124,000), and small animal surgeons had a significantly ( $P < 0.001$ ) higher median income than did large animal surgeons in both private practice (\$228,000 vs \$130,000, respectively) and academia (\$130,000 vs \$113,000; responses entered to the nearest thousand).



**Figure 2**—Personal income by year of diplomate status achievement for all male (blue symbols and lines [ $n = 403$ ]) and female (red symbols and lines [ $n = 280$ ]) respondents of Figure 1 (A) and for only those in private practice (B) and academia (C). Respondents were asked to report their income on a sliding scale to a maximum of \$300,000. Within each panel, the bottom subpanel shows a scatterplot of incomes < \$300,000 (each symbol represents a different respondent) and the top subpanel shows the number of respondents (each symbol is a different respondent) with incomes  $\geq$  \$300,000. The smoothed curves reflect estimates of mean salary for both genders. Overall, annual income for men was 18% higher than that for women ( $P < 0.001$ ). This gender difference was more pronounced in private practice (25%;  $P < 0.001$ ) and less pronounced in academia (8%;  $P = 0.03$ ).

Significant ( $P = 0.008$ ) differences in personal income were identified among respondents living in various regions of the United States. For respondents in small animal private practice, median incomes were highest in the Northeast and Midwest (\$250,000 and \$256,000, respectively) and lowest in the Southeast and West (\$206,000 and \$210,000). For respondents in large animal private practice, the highest median incomes were in the Southeast and Northeast (\$173,000 and \$163,000, respectively) and lowest in the Midwest (\$99,000).

Overall, men had a significantly ( $P < 0.001$ ) higher median income than did women (\$194,000 vs \$129,000, respectively). After adjustment for relevant covariates (age, race or ethnicity, location of residence, employment status, diplomate year, species specialty, number of additional academic degrees

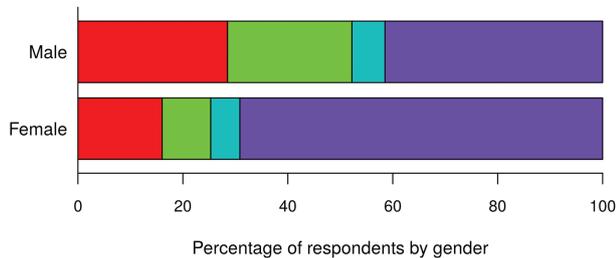
earned, practice type, and academic title or private practice ownership status), the personal income of men was a mean of 18% (95% CI, 12% to 25%;  $P < 0.001$ ) greater than that of women (Figure 2). This difference was evident in both academia and private practice, although after adjustment for the aforementioned covariates, the difference was somewhat less extreme in academia (8%; 95% CI, 1% to 16%;  $P = 0.03$ ) than in private practice (25%; 95% CI, 15% to 36%;  $P < 0.001$ ). No significant ( $P > 0.12$  for all) interaction effects on income were observed between gender and any of the other covariates.

Given the relatively high incomes that might be expected from a career in veterinary surgery, respondents were asked about the relationship between their personal and household incomes. Among respondents who reported being single (whether never married, separated, divorced, or widowed), 97% (156/161) indicated themselves as the primary earner in their household. Among respondents who were married or in a domestic partnership, 69% (427/618) identified themselves as the primary earners, with another 20% (126/618) reporting that their personal income was approximately equivalent to that of another member of the household. In this second cohort (married or in a domestic partnership), men were significantly ( $P < 0.001$ ) more likely than women to identify themselves as the primary earner (78% [286/365] vs 50% [100/199], respectively;  $P < 0.001$ ).

As an alternative measure of assessing career success, respondents were asked to further define their employment

status with respect to their practice setting. Overall, 50% (237/477) of private practitioners described themselves as associates, whereas 25% (119/477) and 19% (89/477) described themselves as majority ( $\geq 50\%$  ownership) or minority (< 50% ownership) practice owners, respectively, and these results were summarized by gender (Figure 3). Men were significantly ( $P < 0.001$ ) more likely than women to participate in practice ownership (52% [141/270] vs 25% [41/162], respectively).

Personal income was examined as a function of practice ownership as a possible explanatory variable for differences in income and to consider the relationship between minority and majority ownership and income. In private practice, associates had a significantly ( $P < 0.001$ ) lower median income (\$179,000) than did those who were minority (\$283,000) or majority (\$253,000) practice owners. In both small

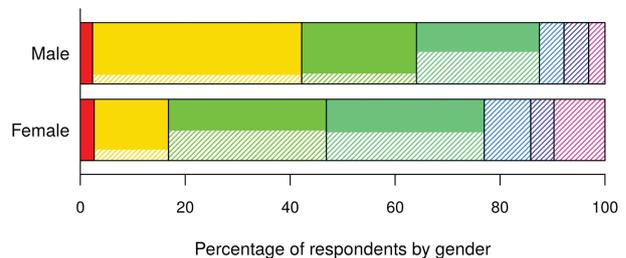


**Figure 3**—Strip plots by gender of the distribution of practice ownership for the male and female respondents of Figure 1 who were in private practice ( $n = 270$  and  $162$ , respectively). Each strip shows the proportion of respondents who reported being a practice owner with  $\geq 50\%$  (red) or  $< 50\%$  (green) ownership; doing freelance, locum, or other work (turquoise); or being an associate veterinarian (purple).

and large animal private practice, respondents who indicated minority ownership reported higher incomes than did those with majority ownership. This difference remained significant after adjustments for the covariates age and diplomate year but was not significant ( $P = 0.99$ ) after adjustment for the number of ACVS diplomates in the practice, suggesting that practice size might have contributed to the observed association. Specifically, surgeons who reported minority ownership worked in practices where the median number of ACVS diplomates was 3, whereas most (58% [69/119]) majority owners were the only diplomate in the practice.

A significant ( $P = 0.006$ ) relationship was also identified between the mean number of hours worked per week and personal income for surgeons who were employed full-time in private practice. Specifically, for every additional 10 hours (approx) of work over a standard 40- to 49-hour work week, a 7% increase in annual income was observed. For example, surgeons who reported working  $\geq 60$  h/wk could be expected to make a mean of 14% more money annually, compared with those who reported working 40 to 49 h/wk. Practice ownership was likely a confounding factor in this association, given that owners reported working significantly ( $P = 0.002$ ) longer hours than did nonowners and, as previously noted, had a significantly higher personal income.

Respondents working in an academic setting were asked about their promotion stage or rank and their track (clinical or tenure), and these responses were summarized by gender (**Figure 4**). Of all male respondents in academia at the time of the survey, 42% (54/128) had been sequentially promoted to achieve full professorship status, compared with only 17% (19/113) of all female respondents in academia. Three men and 3 women reported being in senior administrative (dean or associate dean) positions; 65% (83/128) of men identified themselves as tenured or in tenure-track roles, whereas 45% (51/113) of women identified themselves similarly. With academic title assigned a score on the basis of rank and track, men were more likely to hold a more prestigious title than



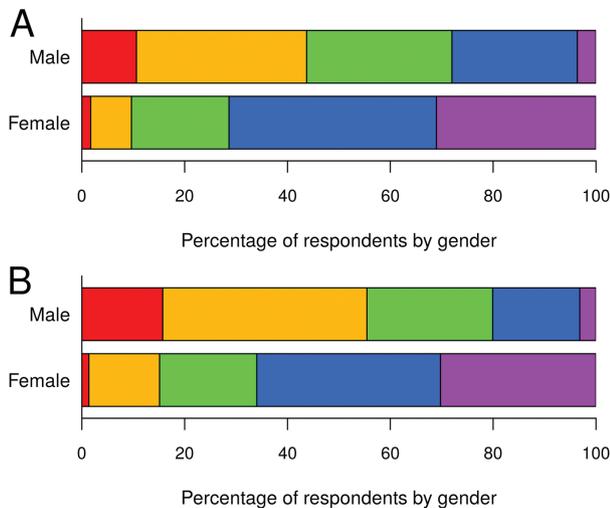
**Figure 4**—Strip plots of academic title (dean or associate dean [red], professor [yellow], associate professor [lime green], assistant professor [sea green], clinical instructor or lecturer [blue], other administration [purple], or other [pink]) for the male and female respondents of Figure 1 who were in academia ( $n = 128$  and  $113$ , respectively). Each title within the professor track is separated into tenure-track (solid fill) and non-tenure-track (diagonal fill) positions, and the area covered by the respective portion of the plot represents the proportion of respondents within those roles.

women by a factor of 1.3 ( $P < 0.001$ ). This result remained significant after adjustment for relevant covariates, including age, race, region, employment status, diplomate year, species specialty, and number of additional academic degrees earned.

Academic title was further evaluated only within the group of surgeons who had achieved diplomate status in or after 2003. This subset represented a portion of the respondents where the male-to-female ratio was roughly equivalent (1.08:1). Among this group, 68 women and 52 men reported being employed in an academic setting. The respective proportions of women and men at the instructor (13% [9/68] vs 10% [5/52], respectively), assistant (49% [33/68] vs 54% [28/52]), and associate (26% [18/68] vs 23% [12/52]) levels were similar. However, 8% (4/52) of men and no women had achieved full professorship status in this subgroup.

## Subjective assessments of professional issues

When asked whether, apart from their own experiences, it was their perception that gender inequality exists between male and female surgeons in private practice and in academia, women were more likely than men to indicate that gender inequality probably or definitely exists in both private practice (71% [207/290] vs 28% [116/414], respectively;  $P < 0.001$ ) and in academia (66% [192/291] vs 20% [83/413];  $P < 0.001$ ; **Figure 5**). In response to whether gender had impacted their salary, ability to secure a position, or job responsibilities, 36% (103/290) of women believed that their income was less than that of similarly qualified male colleagues, whereas only 9% (38/409) of men believed they had a higher salary than similarly qualified female colleagues (**Figure 6**). Significantly ( $P < 0.001$ ) more men (80% [331/413]) than women (53% [154/290]) believed that gender did not have an impact on their ability to be promoted; specifically, 23% (68/290) of women versus 1% (4/413) of men believed their

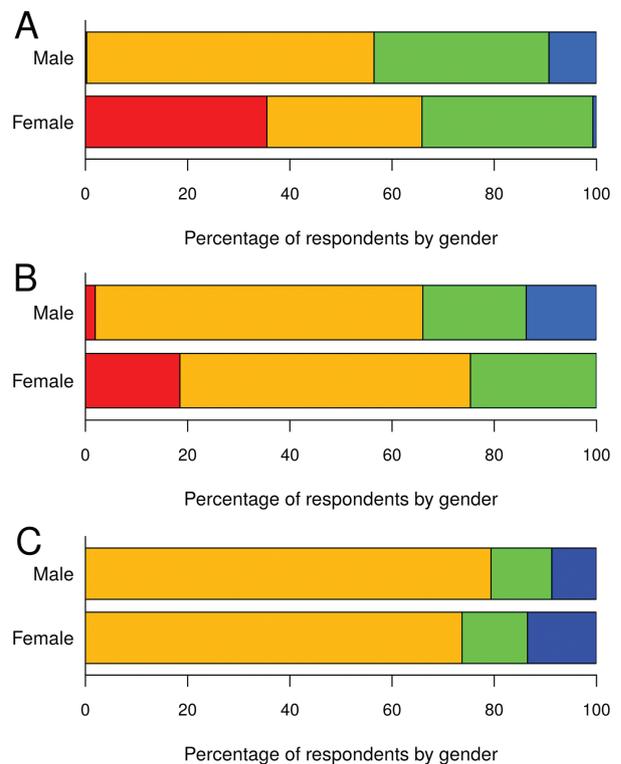


**Figure 5**—Strip plots showing the distribution of responses to the questions “Apart from your own experience, do you feel that gender inequality exists between male and female surgeons in private practice?” (A) and “in academic practice?” (B) for the male ( $n = 414$  and  $413$ , respectively) and female ( $n = 290$  and  $291$ , respectively) respondents of Figure 1. Response options included definitely not (red), probably not (orange), maybe (green), probably yes (blue), and definitely yes (purple).

gender had negatively impacted their promotion in some way, although the specific manner in which this impact manifested was not defined. Similar proportions of men and women believed that gender had influenced their ability to secure and retain a desired job position, but the direction of that influence differed between genders. Eighteen percent ( $54/292$ ) of women versus 2% ( $8/415$ ) of men believed that the influence had been in a negative direction, and 14% ( $57/415$ ) of men versus no women believed that the influence of their gender had been positive. Most women (74% [ $213/289$ ]) and men (79% [ $327/412$ ]) did not believe that gender influenced job responsibilities.

In response to whether respondents believed that their gender had affected client interactions, significantly ( $P < 0.001$ ) more women than men believed that it had (40% [ $117/293$ ] vs 18% [ $76/416$ ], respectively; nature of this effect [positive or negative] not included in question). In response to whether they had been the recipient of comments about their gender related to performance, potential, or productivity, significantly ( $P < 0.001$ ) more women than men indicated that they had (57% [ $167/291$ ] vs 14% [ $56/414$ ], respectively).

Lastly, when respondents were asked to rank from a list of factors those most influential in the decision to pursue their current professional position, passion for the job was identified as the most important force by 47% ( $356/764$ ). Financial compensation and location were ranked equally as the second most influential factors, followed by the ability to have a family. Number of work hours required and emergency duties were most commonly ranked as the least influential factors.



**Figure 6**—Strip plots of how the male and female respondents of Figure 1 perceived the impact of gender on their salary (A;  $n = 409$  and  $290$ , respectively) and ability to secure a desired position (B;  $415$  and  $292$ , respectively) as well as whether gender had influenced their job responsibilities (C;  $412$  and  $289$ , respectively). Response options regarding salary and ability to secure a desired position included negatively (red), no impact (orange), unsure (green), and positively (blue). Options for the third component included no (orange), unsure (green), and yes (blue). Note that respondents were asked whether gender had influenced job responsibilities but not whether they perceived that influence to be negative or positive.

## Discussion

The fairly high response rate (58%) for the survey reported here suggested that the topic of work-life balance and issues related to the shifting gender demographic were of both interest and importance to ACVS diplomates. Our response demographics were similar to those of the 2012 ACVS employment demographics survey,<sup>15</sup> indicating our data represented well the target population of ACVS diplomates. The identified response bias toward females suggested that women may have had slightly more interest or motivation to explore and address these subjects; however, the large number of male respondents supported our supposition that the issues covered by the survey were relevant and of concern to both genders.

We were prevented from assessing nonresponse bias for other demographics (eg, age, diplomate year, or location of residence) owing to lack of available data for nonrespondents for comparison. Nevertheless, our findings clearly delineated some differences between male and female diplomates, both objective

and subjective in nature. Additionally, the results highlighted the sharp divide between small animal and large animal (including equine) surgery subspecialties. Finally, data were obtained that could help others considering a career as a veterinary surgeon anticipate what to expect and be used to target specific areas of concern for maintaining a balance between work and life.

The median year when ACVS diplomate status was achieved by respondents was 2003. Although only approximately one-third of ACVS diplomates are female, our results showed that younger ACVS diplomates comprised a greater proportion of female surgeons, whereas in the older age cohorts, male surgeons outnumbered female surgeons, and for those  $\leq 40$  years old, the proportion of female diplomates was similar to the proportion of male diplomates in the same demographic. As the field of veterinary surgery grows, female surgeons would be predicted to comprise an increasingly larger proportion of the overall profession. This would include those on the late end of the Generation X cohort and millennials who, among other things, have been shown to value wealth more strongly than prior generations.<sup>16,17</sup> Work-life balance is an area of great emphasis for millennials, as opposed to the work-centric attitude of the baby boomer cohort.<sup>16,17</sup>

The increasingly female representation in labor markets is an area of evolving research, but there is strong evidence that increasing proportions of women in a profession produce paradoxical effects on status, compensation, and segmentation of that profession.<sup>18</sup> Consideration of these shifts and how they will be represented proportionally in the veterinary surgical profession will help employers and administrators to shape environments and policies to attract new surgeons.

The presence of underrepresented minorities in the field of veterinary surgery is also relevant to the veterinary profession. In 2012, the US Census Bureau reported that from 2006 to 2010, 91.2% of the total number of veterinarians in the United States were white, with small proportions of underrepresented minorities.<sup>19</sup> This distribution very closely mimics our observations regarding veterinary surgery in the present study. As a result of diversity initiatives from the AVMA and the Association of American Veterinary Medical Colleges, 78.1% of students at US veterinary medical colleges in 2017 were white, 5.4% were Hispanic or Latino, 4.8% were Asian, 2.5% were black or African American, and 0.5% were Native American or American Indian.<sup>20</sup> Such diversity initiatives should be considered for the veterinary surgical profession to help facilitate a similar shift in diversity.

The amount of time spent working affects work-life balance. Only 6% of ACVS diplomates in the present study reported part-time employment, and this distribution was unaffected by gender. In private practice, most female respondents still worked a minimum 40- to 49-hour work week and most male respondents worked 10 hours more, although this dif-

ference was not significant. In the 2016 AVMA Report on the Market for Veterinarians,<sup>21</sup> women were more likely than men to report negative underemployment (ie, the desire to work fewer hours). That preference may have contributed to the aforementioned difference observed between female and male respondents in the present study. In 2014, the US Department of Labor found that women were more likely than men to work part-time and that among those who were employed full-time, men worked slightly longer hours each day than did women (mean, 8.4 vs 7.8 hours, respectively).<sup>22</sup> Interestingly, there was no difference in the prevalence of part-time employment between male and female respondents in our study, but our findings regarding overall work hours did mirror broader trends in veterinary medicine and the general working population.<sup>21,22</sup>

Some differences were observed in the time demand of jobs in academia versus private practice in the study reported here. Other than emergency duty in large animal surgery, surgeons in private practice consistently worked less than did those in academia. Not surprisingly, surgeons reported working long hours. Therefore, for those who prioritize life outside of work, small animal surgeons may best achieve this in private practice, whereas large animal surgeons may find more respite in an academic setting. Given the relative unimportance expressed by respondents regarding the number of hours of work required and amount of emergency duty in job selection, it appeared that other factors played a more important role in attracting surgeons to a specific job opportunity or setting over another.

Approximately 60% of female large animal surgeons in the present study were employed in academia (vs private practice), and the opposite was true for all other surgeons. Our data regarding the relative time demand of private large animal practice may provide some explanation, although incomplete, for this finding regarding female large animal surgeons. Median salary in academic practice was lower than in private practice across all categories, despite relatively equivalent time demands. A pull of qualified individuals away from academia and toward the private sector has been documented in the STEM fields and in human medicine<sup>23,24</sup>; our findings that female ACVS diplomates were more likely than male diplomates to be employed in academic practice and that female surgeons comprised a greater proportion of the younger age cohorts than did male surgeons suggested that the veterinary surgical field may not be similarly affected. The competitive advantages of academia over private practice are not always clear, particularly for small animal surgeons. Other benefits such as health care, vacation, and retirement plan options were not evaluated in the present study.

The administered survey did not allow us to discern how many respondents left academia for private practice or vice versa, and the greater proportion of respondents in private practice than in academia likely reflected the size of the job markets. Still, for

the academic community to continue to attract the most talented individuals for education and research, university administrators may need to develop alternative strategies for employee recruitment and retention for both men and women.

In the present study, each additional 10 hours worked in private practice was associated with a 7% higher annual personal income. Within academia, amount of time spent working factors into promotional advancement, which in turn is one of the few opportunities for a substantial salary increase. Given that 90% of respondents were the major source for, or a major contributor to, household income, working fewer hours may not be a realistic option, particularly for those with educational debt. Efforts by employers to maintain or improve flexibility in schedules may help those interested in achieving a better career-life balance. In addition, efforts by veterinary surgeons to maximize efficiency and learn about alternative methods of creating wealth (such as investing) may help them reduce the number of hours worked without compromising income.

To the authors' knowledge, the present study provided the first large dataset to summarize incomes for ACVS diplomates across practice types and species served. Our data revealed predictable but significant differences in personal income within those factors. Graphic representation of the data revealed a relationship between experience and income; the highest income was reported by those who had received board certification approximately 15 to 20 years before completing the survey, consistent with AVMA findings for the veterinary profession as a whole.<sup>21</sup> Incomes also differed by region of the United States; unsurprisingly, respondents residing in the Northeast reported some of the highest annual incomes. High incomes were also reported by small animal surgeons in the Midwest and by large animal surgeons in the Southeast. Summary data from the AVMA on regional earnings are similar, demonstrating the highest incomes in parts of the Northeast and Midwest.<sup>25</sup> With respect to small animal surgery, the high incomes in the Midwest may have been partially attributable to the high population density within that region.<sup>26</sup> Similarly, in 2005, the American Horse Council Foundation demonstrated some of the highest equine populations in the Southeast, including Kentucky, Florida, Virginia, and North Carolina.<sup>27</sup>

Median personal incomes derived from the present study were higher than those reported for general veterinary practitioners in the 2015 AVMA Report on Veterinary Compensation.<sup>25</sup> The return on investment in a veterinary education has been shown to be poor for many veterinarians and negative for women and equine practitioners, specifically.<sup>28</sup> Such return on investment is likely superior for ACVS diplomates, but our data were insufficient to investigate this possibility, and we were unable to investigate trends in income over time. Another limitation to our dataset was the lack of information regarding educational debt for ACVS diplomates. Specialization requires, at

the minimum, 4 additional years of training following completion of a DVM program, during which time annual income is typically low, and debt and debt-to-income ratios among those graduating from DVM programs are increasing annually.<sup>20</sup> Given the relatively higher incomes and the pressure of increasing educational debts, small animal surgery, in particular, should continue to remain an attractive option, at least to those who consider finances in their career choice.

Male ACVS diplomates, overall, had 18% higher incomes than did female diplomates in the study reported here. Specifically, men in private practice reported 25% higher personal incomes than did women in private practice and 8% higher incomes than did women in academia. Although differences such as practice ownership and promotion level surely played a role in this disparity, our findings were significant even after adjustment for relevant covariates. In 2014, the US Department of Labor reported that women earned 21.4% less than men.<sup>29</sup> In 2013, the median salary of a female veterinarian was 30% and 24% less than the median salary for male veterinarians in private practice and public or corporate practice, respectively.<sup>25</sup> Our data were also similar to those for academic surgeons in US public human medical schools, where the mean salary for male surgeons is almost 10% higher than that of female surgeons after adjustment for confounding variables.<sup>7</sup> The observed smaller income gap in academia versus private practice was likely due to many factors, such as the lack of effect of ownership and a commission-based salary structure as well as university initiatives aimed at assessing pay equity among faculty and programs addressing implicit gender bias.<sup>30,31</sup> Myriad unmeasured factors could contribute to the gender-based income gap, such as differences in how negotiations are handled, the glass-ceiling phenomenon, predominant caseloads (eg, orthopedic vs soft tissue), prioritization of work versus free time, and relative importance of income on personal satisfaction. Labor economists Francine Blau and Lawrence Kahn reported<sup>32</sup> on the various contributors to the wage differential between men and women in the US labor force, yet still described approximately 40% of that gap as unexplained or, rather, not attributable to any characteristic other than gender alone. Diplomat year was accounted for in our statistical model of factors associated with personal income in the present study, suggesting that the larger proportion of young female (vs male) diplomates (presumed to have less experience or seniority) was not the primary cause for the gap. Furthermore, the gap did not appear to be narrowing to any great degree among surgeons entering the field (Figure 2).

Regardless of the reasons for the income discrepancy between genders, it was interesting to note how the subjective view of the role of gender in the workplace differed between male and female ACVS diplomates who responded to the survey. Significantly more women than men (36% vs 9%, respectively) believed that gender had influenced salary in some way.

More women than men believed that gender inequality probably or definitely exists in private practice and academia. More discussion of, and education about, these issues will be important as the demographic composition of the ACVS evolves.

Diplomates participating in practice ownership reported approximately \$70,000 to \$100,000 higher personal incomes than did those who remained at the associate level. Individuals who owned < 50% of their practice, interestingly, reported higher incomes than did those who owned > 50%. Annual personal income was evaluated, and this statistic does not reflect true wealth, such as the amount of equity held by a practice owner versus shareholder. Therefore, the observed income discrepancy should be interpreted with caution. The difference between ownership categories was partially explained by correcting for the number of ACVS diplomates in the respondent's practice; those who owned < 50% of their practice generally worked in settings with more diplomates (median of 3) than did those who owned > 50% (median of 1). Although this did not necessarily represent practice size, in the authors' experience, larger specialty hospitals often employ more surgeons and are more likely to offer shared ownership than are smaller specialty hospitals. The findings may have suggested an economic advantage to hospitals with more surgeons or may simply have reflected that larger practices generate more income. Finally, it is important to remember that financial gain is likely not the sole motivator for those pursuing ownership roles. For ACVS diplomates contemplating practice ownership, our findings may be helpful in the decision-making process.

Substantially more men than women reported private practice ownership to some extent. Reasons for pursuing ownership were not investigated further; however, it is likely that work-life balance played a role in the choices made in this regard. Respondents who reported working  $\geq$  60-hour work weeks had a significantly greater personal income than did those who worked less; in the model of factors associated with personal income, practice ownership was a confounding factor, suggesting a relationship between ownership and time spent working. The demands and stresses placed on a practice owner may simply be less desirable to some ACVS diplomates than others. Irrespective of the factors underlying the observation that fewer females than males were practice owners in the present study, the gender discrepancy in practice ownership may be an important area for consideration as females comprise a growing proportion of the veterinary surgical profession. Targeting female surgeons for business and management educational opportunities could help incentivize participation in practice ownership in the future.

In academia, male respondents were more likely than female respondents to hold a prestigious title (based on rank and track), a difference that remained significant even after adjustment for relevant covariates. Only approximately 15% of women had advanced to a full professorship, compared with approximately

41% of men. This disparity appeared to persist even within a younger, predominantly female subset of academic surgeons. Similar observations have been made in human medical and STEM departments across the United States.<sup>8,30,31,33-36</sup> At the assistant professor level, approximately half of male and female ACVS diplomates in the present study reported being in tenure-track versus non-tenure-track roles; for females at the associate level, this proportion was similar but > 80% of males in an associate-level position were tenured. These findings highlighted 2 important concerns: that women were less likely to advance into more prestigious roles and that, overall, a smaller proportion of academic surgeons were pursuing tenure. Possible explanations such as the persistence of traditional gender roles, sexism, lack of mentorship, access to resources, collaborative opportunities, and the tendency for women to spend more time performing service and mentorship than research have been investigated in STEM fields,<sup>8,11,30,31,36</sup> and many of these factors are likely to exist in veterinary medicine. Efforts toward recruitment and increased placement of women in senior leadership and mentorship positions in veterinary surgery would be advisable given the findings of the present study; however, the impact of women in higher-ranking roles on advancement of other women has not yet been shown to be positive in other areas of higher education.<sup>31,36,37</sup> For both genders, the redefinition of traditional academic paths may help allow faculty to pursue tenure-track appointments that concentrate on areas other than research, such as teaching or service, as advancement criteria.

Since 1999, large animal surgery and small animal surgery have been recognized as different specialties within the ACVS, and that distinction appears appropriate for many reasons. Overall, large animal surgeons worked longer hours, with little peer support, and spent more time on call, making quite a bit less personal income than did their small animal counterparts. The 2012 employment demographics survey<sup>15</sup> administered by the ACVS clearly demonstrated the relative paucity of job opportunities available to individuals completing a residency in large animal surgery. Most large animal surgeons in private practice in the present study reported being solo surgeons, limiting flexibility with respect to emergency duty sharing and opportunity for time off. Still, passion for a career as a large animal surgeon would be challenging to measure and should not be underestimated; for many, working with horses and other large animals is as much of a lifestyle choice as it is a job.

The present study had several limitations that are important to consider when interpreting the findings. One limitation was the subjective nature of a survey, in that even quantitative data can be influenced by factors such as subjective interpretation and internal bias. For example, respondents reported the number of hours they work per week, on average, and their interpretation of "work" might have differed. Second, any identified associations cannot be

interpreted as causal given the cross-sectional study design. Third, no clear definition exists of the term work-life balance and, therefore, it is a difficult outcome to measure. Instead, we attempted to use data that were measurable, such as the amount of time an ACVS diplomate spent working or on call, how much that time might have influenced income, and, as reported elsewhere,<sup>14</sup> how individuals have built and maintained families, to provide information that can be used to estimate how elements of career and life as a veterinary surgeon intersect. Furthermore, job satisfaction was not measured and so the overall climate among ACVS diplomates could not be determined. All information generated here should be considered with these limitations in mind.

Regardless of any limitations, we believe the survey data will be valuable for shaping policy, structuring negotiations, and making decisions in veterinary surgery. Perhaps our most poignant finding was that, regardless of other findings, ACVS diplomates remained passionate about their jobs and that this factor, outside of money, time, and even work-life balance, was still the most important element fueling the profession.

## Acknowledgments

Statistical analysis was supported by the Clinical and Translational Science Award program, through the NIH National Center for Advancing Translational Sciences (grant No. UL1TR002373). No other funding or support was received in connection with this study or the writing or publication of the manuscript.

The authors declare that there were no conflicts of interest.

## Footnotes

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### From this month's AJVR

#### Comparison of the effects of a dexmedetomidine-ketamine-midazolam anesthetic protocol versus isoflurane inhalation anesthesia on echocardiographic variables and plasma cardiac troponin I concentration in black-tailed prairie dogs (*Cynomys ludovicianus*)

Evan Ross et al

##### OBJECTIVE

To compare the effects of a dexmedetomidine-ketamine-midazolam (DKM) anesthetic protocol versus isoflurane inhalation anesthesia on echocardiographic variables and plasma cardiac troponin I (cTnI) concentration in black-tailed prairie dogs (BTPDs; *Cynomys ludovicianus*).

##### ANIMALS

9 six-month-old sexually intact male captive BTPDs.

##### PROCEDURES

Each BTPD was randomly assigned to be anesthetized by IM administration of dexmedetomidine (0.25 mg/kg), ketamine (40 mg/kg), and midazolam (1.5 mg/kg) or via inhalation of isoflurane and oxygen. Three days later, each BTPD underwent the alternative anesthetic protocol. Echocardiographic data and a blood sample were collected within 5 minutes after initiation and just prior to cessation of each 45-minute-long anesthetic episode.

##### RESULTS

Time or anesthetic protocol had no significant effect on echocardiographic variables. For either protocol, plasma cTnI concentration did not differ with time. When administered as the first treatment, neither anesthetic protocol significantly affected plasma cTnI concentration. However, with regard to findings for the second treatments, plasma cTnI concentrations in isoflurane-treated BTPDs (n = 4; data for 1 animal were not analyzed because of procedural problems) were higher than values in DKM-treated BTPDs (4), which was suspected to be a carryover effect from prior DKM treatment.

##### CONCLUSIONS AND CLINICAL RELEVANCE

The DKM and isoflurane anesthetic protocols did not have any significant effect on echocardiographic measurements in the BTPDs. Increases in plasma cTnI concentration during the second anesthetic episode were evident when BTPDs underwent the DKM anesthetic protocol as the first of the 2 treatments, suggestive of potential myocardial injury associated with that anesthetic protocol. Clinicians should consider these findings, especially when evaluating BTPDs with known or suspected cardiac disease. (*Am J Vet Res* 2019;80:1114-1121)



December 2019

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