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Vocational choices made by alumni of the Leadership Program for Veterinary Students at Cornell University

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Abstract

OBJECTIVE—To compare vocational aspirations and outcomes of participants in the 10-week Leadership Program for Veterinary Students at Cornell University.

DESIGN—Survey.

SAMPLE—Veterinary students who participated in the program between 1990 and 2013.

PROCEDURES—Questionnaires that sought information about the career aspirations of participants at the beginning and end of the program were reviewed, along with records documenting the career progression of participants, audio recordings of interviews conducted with students, and notes of vocation-oriented counseling sessions held during each year's program.

RESULTS—At the conclusion of the program, 143 of 174 (82%) participants indicated they were more likely than not to undertake research training after completing their veterinary degree, compared with 106 of 174 (61%) at the beginning. Participation also stimulated interest in residency training and industry, but did little to promote interest in careers in government or the military. The percentage of participants who indicated they were more likely than not to pursue additional training in private practice decreased from 97 of 174 (56%) at the beginning of the program to 75 of 174 (43%) at the end. Information on career progression was available for 391 individuals, of whom 177 (45%) were pursuing careers of the kind envisioned by the program. However, 189 (48%) participants had a career in general or specialty clinical practice.

CONCLUSIONS AND CLINICAL RELEVANCE—The Leadership Program appeared to have a short-term influence on careers anticipated by program participants. However, a substantial proportion pursued careers in clinical practice after graduation.

For schools of veterinary medicine, helping veterinary students successfully attain careers in fields other than clinical practice can be quite challenging, partly because students are often uninformed about the full range of career options available to them and partly because so many students enter veterinary school with a strong commitment to pursue clinical practice.

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Although veterinary students have opportunities to conduct research through various summer programs and research electives, they may not receive appropriate advice on how best to prepare for a career in which discovery or public service would represent a substantial portion of their professional activities. Programs such as those sponsored by Meriel and the National Institutes of Health are attempting to address this deficiency; however, outcome analyses of those initiatives have not yet been reported. Hence, it is an open question whether programs of this sort can alter the vocational choices of students, leading to an increase in the number of veterinary graduates entering science-based careers.

The Leadership Program for Veterinary Students at Cornell University is a 10-week summer research program for students that is intended to acquaint participants with careers in research and veterinary public health. It combines laboratory-based research with workshops designed to encourage creativity, critical thinking, and the development of communication and teamwork skills.^{1,2} The program also features vocational counseling intended to guide students in their selection of graduate training experiences.³ This counseling is based on the belief that careful planning at an early stage in the professional education of veterinary students is particularly important, given the disjunction between the number of individuals pursuing advanced training in science and the limited opportunities for even highly qualified candidates to access entry-level positions in the science workforce.^{4–8}

The purpose of the study reported here was to determine career outcomes of Leadership Program participants. Specifically, we wanted to compare vocational aspirations of participants at the beginning of the 10-week program with their aspirations at the end of the program and with definitive career outcomes to determine what effect, if any, participation in the program might have had on the career choices made by these individuals.

Materials and Methods

Two types of objective data were used for the study. The first consisted of responses to questionnaires distributed each year from 2004 through 2015 that sought information about the career aspirations of participants at the beginning and again at the end of the 10-week program. The second consisted of records documenting the career progression of program participants. These records were updated annually, beginning the year that respondents graduated with the DVM degree or its equivalent. The recorded data documented current activities of respondents, their career plans, and requests for assistance, along with the participants' thoughts on how best to explore their employment prospects. Data for individuals who participated in the Leadership Program between 1990 and 2006 were analyzed. This period was chosen because it was expected that the individuals concerned would have entered a career they were likely to pursue for the remainder of their working lives.

In addition, audio recordings of interviews conducted by one of the authors (DRF) with each student toward the end of the 10-week program each year from 1999 through 2003 were reviewed to obtain additional information regarding the careers anticipated by program participants. These aspirations were then compared with the careers participants ultimately pursued, as determined from the alumni data.

Finally, notes of the 5 vocation-oriented counseling sessions held during each year's program were reviewed. Each of these sessions involved faculty mentors and veterinarians currently in advanced training. The counselors commented on the range of vocational options available to program participants and the need to access and compare information about the type, location, and scope of graduate training. Program participants were encouraged to ask questions and express their preferences.

Statistical analysis

Respondents were asked to assess their likelihood of considering particular career options (research training, residency training, positions in industry, government service, military service, or private practice) in the first 5 years after they obtained their veterinary degree. Responses were collected at the beginning of the summer program and then again at the end of the program. The null hypothesis tested was that the ranking of preferences for career options following graduation at the beginning and the end of the summer program would be the same. The data were ordinal, and the paired before and after responses for each career option were analyzed with the Wilcoxon signed rank test. Values of $P < 0.01$ were considered significant. This P value cutoff was chosen to control for experimentwise error with multiple testing. Some responses were highly skewed (eg, 86% of respondents indicated that they had 0% likelihood of choosing a military career). As a consequence, any change would be predominantly in 1 direction and would be considered 1 tailed; for such data, the P value cutoff was set at 0.005. Statistical testing was performed with standard software.^{a, b}

Results

Career aspirations of participants at the beginning and end of the program

Questionnaires completed by 174 individuals who participated in the Leadership Program between 2004 and 2015 were available for review. At the beginning and end of the program, participants were asked to indicate the likelihood (0%, 20%, 40%, 60%, 80%, or 100%) that they would pursue further training in research, enter a structured residency program, or acquire additional experience in industry, government, the military, or private practice during the first 5 years after they were awarded their veterinary degree. At the beginning of the program, 61% of the participants indicated they were more likely than not (ie, likelihood of 60%, 80%, or 100%) to undertake research training after completing their veterinary degree (Figure 1), but by the end of the program, this had increased to 82%. Participation in the program also stimulated interest in residency training (percentage who indicated they were more likely than not to pursue a structured residency increased from 49% to 65%) and industry (percentage who indicated they were more likely than not to pursue additional training in industry increased from 17% to 40%) but did little to promote interest in careers in government or the military. On the other hand, the percentage of participants who indicated they were more likely than not to pursue additional training in private practice decreased from 56% at the beginning of the program to 43% at the end.

^aR, version 3.30, R Foundation for Statistical Computing, Vienna, Austria. Available at: www.r-project.org/. Accessed Aug 16, 2016.

^bThe data set and R script are available from the corresponding author on request.

Vocational concerns of program participants

Notes from the 5 vocation-oriented counseling sessions held during each year's Leadership Program indicated that most participants appreciated the value of research, understood the nature of graduate clinical and service experiences, and understood the commitment expected of trainees who sought such training. Participants were concerned about the cost and time required to become truly proficient in science, and many worried that a protracted period of graduate education would be difficult to reconcile with creating a fulfilling lifestyle with a spouse or partner, having children, and pursuing other personal interests.

Definitive careers of program participants

Information on career progression was available for 391 individuals who participated in the Leadership Program between 1990 and 2006. Of these, 177 (45%) were pursuing careers of the kind envisioned by the program, including 105 (27%) with a career in academia, 43 (11%) with a career in industry, 22 (6%) with a career in government service (ie, public health, research, military service, or administration), and 7 (2%) with a career working for a nongovernmental organization in a research, service, or administrative capacity. However, 189 of the 391 (48%) participants elected to pursue a career in general or veterinary specialty practice, while the remaining 25 (6%) chose full-time consulting, non-veterinary careers or other unspecified vocations or were deceased.

To more specifically examine the career progression of program participants, information regarding careers anticipated by 117 individuals who participated in the program between 1999 and 2003 were compared with the careers those individuals ultimately pursued. At the conclusion of the program, 54 participants anticipated a discovery-based career in academia (ie, working in a major research role at a university that required a PhD as a prerequisite qualification). Twenty (37%) of these individuals pursued a career of that sort; 15 (28%) became academic clinicians or service specialists in industry, government, or nongovernment agencies; and 19 (35%) entered careers in general or veterinary specialist practice. Of the 29 participants who anticipated a service career at the end of the Leadership Program, 3 (10%) pursued a career in academia, 15 (52%) pursued a service career, and 11 (38%) entered general or specialty practice. Finally, of the 34 participants who were undecided at the conclusion of the program, 5 (15%) gravitated into academic careers, 10 (29%) became service specialists, and 19 (56%) entered general or specialty practice.

Career choices made by participants from North America versus other countries

Information was available regarding postgraduate degrees obtained by 564 individuals who participated in the Leadership Program between 1990 and 2013. Overall, 52 of 281 (19%) graduates from schools of veterinary medicine in the United States and Canada completed a PhD degree, compared with 131 of 283 (46%) graduates from schools in other countries. Percentages of participants obtaining other degrees did not differ as much, with 13 of 281 (5%) graduates from North American schools and 5 of 283 (2%) graduates from other countries obtaining a master's of public health degree and with 9 of 281 (3%) participants from North America and 14 of 283 (5%) participants from other countries obtaining a master's of science degree. By contrast, the percentage of graduates from North American schools who pursued specialty training through a residency program (111/280 [40%];

information was missing for 1 individual)) was substantially higher than the percentage of graduates from other schools (57/283 [20%]) who did.

Finally, for individuals who participated in the Leadership Program between 1990 and 2006, the percentage who ultimately pursued a career in private clinical practice was substantially higher for participants from the United States (122/198 [61.6%]) and Canada (10/14 [71%]) than for participants from Australia (24/69 [35%]), the United Kingdom (17/49 [35%]), Germany (9/31 [29%]), and all other countries (7/25 [28%]).

Careers favored by female versus male participants

To determine whether gender was associated with ultimate career choices made by program participants, information was obtained for 245 women and 120 men who took part in the program between 1990 and 2006. For participants from North American schools, 95 of 143 (66%) women and 40 of 62 (65%) men pursued careers in private practice. For participants from schools in other countries, 44 of 102 (43%) women and 11 of 58 (19%) men became private veterinary practitioners.

Attrition of academic veterinary scientists

An unexpected outcome of the present study was that 18 program alumni who began their careers as entry-level faculty members later abandoned those positions. Another alumnus with similar aspirations began his career as a government service specialist but followed a similar course. Three of these individuals entered general practice, 12 became veterinary practice specialists, 3 assumed service or administrative positions in industry, and 1 elected to pursue nonveterinary interests.

Discussion

The Leadership Program for Veterinary Students at Cornell University was developed as a tool to guide appropriately motivated veterinary students into careers in science or veterinary public health. To our surprise, however, 189 of 391 (48%) of the sampled population entered private practice. The outcome was unexpected given the enthusiasm for discovery and public service expressed in student applications for admission to the program, the satisfaction expressed by program participants with their research experiences, and their engagement in science-based enrichment modules featured in the Leadership Program. A plausible explanation for this finding is that in their applications, students were inclined to emphasize their interest in perceived objectives of the program. Alternatively, it is possible that participation in the Leadership Program diminished their interest in a science-based career, that the prospect of extended training after graduation was too daunting or too expensive, that they became comfortably accommodated in a clinical practice they initially entered as a temporary expedient, that they found it difficult to coordinate a career in science with a spouse or partner's career, or that a strong vocational commitment to a career involving hands-on experience with animals overrode any interest they had in developing a career in science.

In reviewing the career progression of Leadership Program participants, we identified a striking difference between the vocational choices made by participants from veterinary

schools in North America versus choices made by participants from institutions located elsewhere in the world. Of the 212 individuals from the United States and Canada who participated in the program between 1990 and 2006, 132 (62%) pursued a practice-based career, whereas only 57 of the 174 (33%) individuals from other countries made a similar choice. The reasons for this geographic difference are a matter of speculation. However, it may be pertinent that students who attend veterinary schools in the United States and Canada typically do so after completing an undergraduate degree. This sequential education is less frequent among students who attend veterinary schools in other countries. Hence, veterinary students in North America are somewhat older and might be expected to have higher amounts of educational debt than their counterparts in other schools. In addition, veterinary schools in North America tend to offer a greater range of opportunities for students to satisfy their interest in science-based careers. Therefore, it is plausible to think that some science-oriented students from North American schools may have pursued their interests through local programs rather than applying for admission to the program at Cornell.

We did observe a gender bias among Leadership Program participants who chose private practice as their career choice, but the bias was observed only among participants from veterinary schools outside North America. While this finding was unexpected, it could be explained by a combination of factors related to the number of veterinarians educated in the countries represented in the study, the lifestyle preferences of the individuals concerned, and the financial rewards available to them. It may be pertinent in this regard that private clinical practice offers flexibility and remuneration for part-time employment that could be especially attractive to graduates who seek a balance between professional activities and family responsibilities.

During vocation-oriented counseling sessions, it appeared that participants in the Leadership Program often had difficulty understanding how basic research could contribute to the solution of disease problems. When placed in the position of conducting basic research, they may have felt they were relinquishing their professional commitment to improving the health of animals. If this was indeed the case, then exposing veterinary students to basic research may in itself be insufficient to convince them that such research has the prospect of leading to fundamental understanding of disease and the solution to major health problems. Effective ways to overcome these obstacles need to be found.

Through vocation-oriented counseling sessions, it also became clear that Leadership Program participants often were concerned about the cost required to gain the knowledge and skills needed for successful careers in areas other than clinical practice. Acquiring a veterinary degree is time-consuming and expensive. Indeed, tuition and living expenditures incurred during the formative stage of a science-based career often exceed the financial capacity of all but the most affluent individuals. That reality underscores the need to inform individuals interested in pursuing science-based careers about financial assistance offered by federal, state, and private sponsors. The National Institutes of Health has been a leader in this regard. Individuals who are US citizens or permanent residents may be eligible for appointment to a National Institutes of Health-sponsored institutional training grant, an individual fellowship, or a mentored research award.⁹ Opportunities for reducing or

deferring the repayment of educational debt should also be considered, bearing in mind that some of these options are limited by citizenship or other conditions imposed by sponsors. Loan repayment programs are sponsored by the National Institutes of Health and the USDA.^{10,11}

Achieving a satisfactory balance between professional and personal goals was also found to be a frequent concern of participants in the Leadership Program, with many commenting on their desire to balance professional aspirations, personal interests, and family responsibilities. Although prepared to accept a finite period of intensive training, they were reluctant to pursue career paths where the necessary time and effort commitments were ongoing impediments to a preferred lifestyle. This alone may have persuaded some program participants to modify or even abandon careers to which they had previously been committed and opt, instead, for a career in clinical practice. Careers in practice, although demanding, can more readily accommodate the lifestyle preferences of many individuals. Moreover, practice offers more choices from a geographic perspective.

Comments from the vocation-oriented counseling sessions also indicated that academic careers were perceived to be stressful and to require more time than other vocational options. The challenge of securing funding for research also was viewed as an ongoing problem. On the other hand, the benefits of an academic career (eg, flexibility of hours, opportunities to teach, and freedom to choose research direction) were often not fully appreciated. These aspects of science-based careers should be better emphasized.

The importance of mentoring, both as an inspirational experience and for the practical benefits of vocational planning, was reflected in the experiences of Leadership Program participants. One might anticipate that program participants would be well informed about the training needed for a career in research. It was clear from counseling sessions that some were but many were not. While still in veterinary school, students often fail to evaluate their graduate training options objectively or give career planning the attention it deserves. Another difficulty is that students drawn to research may be influenced by the personality of prospective research mentors they encounter during their veterinary education. Too often, they overlook or fail to objectively assess a prospective mentor's performance as a scientist.

Leadership Program participants were encouraged to consider these matters and to make training decisions only after they discussed their interests and objectives with trusted advisors and individuals currently in training. Individuals contemplating graduate training are advised to seek relevant information concerning prospective mentors, much of which can be accessed electronically. This includes, but is not limited to, a prospective mentor's training record, his or her academic progression and productivity, the scholarly journals in which he or she has published, and peer regard as reflected in the frequency with which his or her published reports are cited in the scientific literature.

An important finding that emerged from the present study was that 18 Leadership Program alumni elected to abandon an academic career to which they had initially been committed. Various reasons were offered for their decisions. These reasons included financial benefits and lifestyle considerations; however, the most frequently cited reasons were insufficient

guidance in the performance of their duties and unrealistic expectations that failed to conform with their training and professional interests. Preparing veterinarians for an academic career entails a commitment of 8 years or more and an investment of approximately \$800,000, when one considers stipends, graduate tuition, health benefits, and expenditures related to training and indirect costs. Whatever the total costs may be, they represent a substantial investment that should not be squandered.

This loss of individuals who had entered an academic career suggests that greater consideration should be given to promoting faculty satisfaction and fairness in professional evaluations. Although institutions are constrained by their mission and the resources available to them, we believe more attention should be given to aligning faculty effort with individual interests and skills. It is not uncommon for veterinary colleges in the United States to hire faculty members who hold a veterinary degree, board certification in a clinical or service discipline, and a PhD degree. In our experience, however, such individuals often find that their service activities require greater effort than they were led to expect. Given the imperative of teaching, an increase in clinical or service effort erodes the time available for research. Although the situation is well recognized, our findings suggest that it remains a problem. Thus, we make the following recommendations:

- Faculty effort should conform to the institution's mission and reflect the skills and demonstrated proficiency of the individuals concerned.
- An institutional plan should be in place for enhancing teaching proficiency and other academic functions.
- Performance reviews should include the setting of both short- and long-term career goals.
- Consideration for promotion to tenure should include preliminary assessment of the candidate's research, teaching, and service activities individually by experts in each of those functions.

Greater attention to these matters would likely enhance faculty morale, diminish attrition, and link faculty performance to the success of the institutions they serve.

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Figure 1.

Responses to questionnaires administered to 174 individuals who participated in the Leadership Program for Veterinary Students at Cornell University between 2004 and 2015. At the beginning and end of the 10-week program, participants were asked to indicate the likelihood (0%, 20%, 40%, 60%, 80%, or 100%) that they would pursue further training in research (A), enter a structured residency program (B), or acquire additional experience in industry (C), government (D), private practice (E), or the military (F) during the first 5 years after they were awarded their veterinary degree. In each graph, the vertical dotted line separates respondents who indicated they were more (likelihood of 60%, 80%, or 100%) or less (likelihood of 0%, 20%, or 40%) likely to pursue training in each of the 6 areas. The Wilcoxon signed rank test was used to test the null hypothesis that there were no differences in the ranking of responses obtained before and after the program. The α level for type I error was set at $P < 0.01$ to account for experimentwise error of multiple testing for all paired analyses except for the paired before and after responses of likelihood to undertake a career in the military, for which a cutoff of $P < 0.005$ was used because any changes would be predominantly 1 tailed rather than 2 tailed.