

VETERINARY MEDICINE LOAN REPAYMENT PROGRAM



Five-Year Review: 2010 – 2015

October 2015

I. Overview: The Veterinary Medicine Loan Repayment Program

The Veterinary Medicine Loan Repayment Program (VMLRP)¹ was born out of concerns that long-term shifts in the veterinary workforce have left some food animal producers, especially those in rural and remote areas of the United States (U.S.), without access to adequate veterinary medical services. The percentage of veterinarians pursuing careers in food-animal practice has been in steady decline since the end of World War II when roughly half of the members of the American Veterinary Medical Association (AVMA) were engaged in food animal practices. Today, only 5 to 8% of graduating veterinarians join private practices with an emphasis on food animals.² Shifts in the veterinary workforce are the result of multiple economic and social forces that need to be addressed by all stakeholders.³ The VMLRP addresses one factor that contributes to the shortage of food animal veterinarians – the soaring levels of educational debt that put food animal practice out of financial reach for most new and mid-career veterinarians.

Building a practice in rural and remote communities while paying off educational loans is financially impossible for most early career veterinarians. According to the AVMA's 2013 survey of fourth-year veterinary students, the mean veterinary educational debt was \$136,320; 30% of those with educational loans had accumulated over \$200,000 in debt.⁴ Excluding salaries for positions in advanced education, the mean starting salary in 2013 was \$70,113 for male veterinarians and \$66,491 for female veterinarians,⁵ and in 2014 the U.S. Department of Labor estimated the mean and median annual wages of all veterinarians were \$98,230 and \$87,590, respectively.⁶ In addition to financial disincentives, many veterinary shortage situations are located in areas of the U.S. where annual mean wages are in the bottom quartile. Food animal producers in these communities require veterinary services, but often do not provide enough work for a full-time food animal veterinarian. These factors further limit the profitability and feasibility of practicing food animal veterinary medicine in areas where shortages exist.

The National Veterinary Medical Service Act (2003) gives the Secretary of Agriculture authority to determine if and where veterinary shortages exist in the U.S. and its Insular Areas, and to enter into loan repayment contracts with veterinarians to mitigate these shortages. The National Institute of Food and Agriculture (NIFA), on behalf of the Secretary of Agriculture, designates shortage areas based on nominations submitted by the Chief State Animal Health Officials (SAHOs) of U.S. States, Territories and the Federal Government describing why a veterinarian is needed in a particular location. Each year, up to 266 shortage situations may be nominated for inclusion in the VMLRP. In FY 2014, NIFA designated 182 shortage situations as eligible for

¹ National Veterinary Medical Services Act, P.L. 108-161, December 6, 2003.

² "Vet Med Today: Facts and Figures," Journal of American Veterinary Medicine Association (JAVMA) 243(8), October 15, 2013, pp. 1125-26.

³ See Veterinary Medicine Workforce Needs (National Academies Press, 2014) and "Estimating Food Supply Veterinary Medicine Demand and Maintaining the Availability of Veterinarians for Careers in Food Supply Related Disciplines in the United States and Canada," (Food Supply Veterinary Medicine Coalition, 2006).

⁴ ~10% did not report any debt; "Vet Med Today: Facts and Figures," JAVMA 15 Oct. 2013: 1125-26.

⁵ "Vet Met Today: Vet Med Today: Facts and Figures," Journal of American Veterinary Medicine Association (JAVMA) 243(8), October 15, 2013, pp. 1122.

⁶ U.S. Department of Labor, "Occupational Employment and Wages" May 2014, September 2015 <[<http://www.bls.gov/oes/current/oes291131.htm#\(3\)>](http://www.bls.gov/oes/current/oes291131.htm#(3))>.

consideration by veterinarians applying to the program. Funding appropriated by Congress has allowed VMLRP to offer approximately 50 awards (new and renewal) each year.

In exchange for providing up to three years of veterinary services in a shortage area, the VMLRP provides veterinarians up to \$25,000 per year to repay eligible educational debt. Loan repayments are made on a prorated, quarterly basis and are provided directly to the lender rather than the awardee. Funds can be used to repay principal and interest on government and commercial loans received to finance attendance at a college of veterinary medicine that is accredited by the American Veterinary Medical Association (AVMA) and awards the degree of Doctor of Veterinary Medicine or the equivalent. These awards are considered taxable income. To help alleviate this additional tax burden, VMLRP also provides awardees with 39% of the awarded amount to be paid to the IRS.

The VMLRP does not require veterinarians to commit their entire practice to food animal medicine. Among the VMLRP's three shortage types (Figure 1), veterinarians are able to build diversified practices in which income generated from caring for companion animals can help sustain the food animal side of their practice. Type I shortages require the highest commitment of time - 80% - to food animal practice and allow veterinarians to service either rural or non-rural areas. The time commitment devoted to food animal practice drops to 30% in Type II shortages in which veterinarians are required to service rural areas that are remote or economically depressed.⁷ Type III shortages address gaps in the public sector, typically in government and institutions of higher education.

The three types of VMLRP shortage situations were designed to provide flexibility to the states. For example, an increase in beef production in Arkansas led to the nomination of a Type III shortage area in the University of Arkansas Cooperative Extension Service to support a part-time veterinarian to help educate livestock producers and organizations. Similarly, numerous states have nominated shortages in their Departments of Food and Agriculture. These agencies play important roles in protecting livestock and poultry and ensuring safe food products for consumers, but many struggle to

FIGURE I. SHORTAGE TYPES

Type I Shortage – 80 percent or Greater Private Practice Food Supply Veterinary Medicine

Type I shortage situations require at least an 80% time commitment to private practice food supply veterinary medicine. The shortage situation often spans contiguous counties and may be located in rural or non-rural areas as long as the veterinary service shortage is consistent with the definition of “practice of food supply veterinary medicine.”

Type II – 30 percent or Greater Private Practice Food Supply Veterinary Medicine in a Rural Area

Type II shortages must be in an area satisfying the definition of “rural” (see footnote 7). Award recipients commit at least 30% of their practice to serving in remote or economically depressed rural areas. Producers in these areas need but are unable to support a full-time food animal veterinarian.

Type III – 49 percent or Greater Public Practice

This broad category includes many types of specialized veterinary training and employment related to food supply and public health veterinary workforce capacity and capability. These positions are typically located in city, county, State and Federal Government, and institutions of higher education.

⁷ NIFA defines “rural” as “any area other than a city or town that has a population of 50,000 inhabitants and the urbanized area contiguous and adjacent to such a city or town.” Federal Register, “Rules and Regulations,” Vol 75 (74) April 19, 2010.

recruit and retain veterinarians because educational debt levels are high relative to public sector salaries.

As of September 2015, only two cohorts of awardees (2010 and 2011) have completed their three-year terms of service. Thus sufficient data are not yet available to accurately assess the long-term impact of the VMLRP. Over the next few years, NIFA will begin tracking awardees to determine how many continue to service their shortage situations beyond the term required by their award and for how long. Some awardees, through informal communication, indicated that they have bought or plan to buy into a local veterinary practice – a significant career decision made financially possible, in part, through debt repayment support.

II. VMLRP Accomplishments

NIFA's implementation of the VMLRP has attracted wide participation by Federal, State, and U.S. Insular Area officials who nominate shortage areas and veterinarians who seek opportunities in the food animal sector. As of 2014, over 800 veterinarians have applied and \$25,083,849 in total funding has been awarded (Table 1). The 264 veterinarians who accepted awards filled shortage situations in 45 states. The success rate of new applicants has ranged from 24% to 50%, indicating the competitive nature of the program.

Creating Opportunities in Food Animal Veterinary Medicine

From 2010 to 2014, NIFA offered an average of 58 awards and issued an average of 53 contracts per year (Table 1). Roughly 50 awards will be offered in 2015. The number of veterinarians placed in shortage situations each year depends on several factors including the amount of funding appropriated by Congress, the number of shortage nominations and designations, and the quality of the match between an applicant and their selected shortage situation.

Funding. Funds appropriated for VMLRP do not expire at the end of each fiscal year and remain available to NIFA until used for awards. If veterinarians decline their awards, the funds roll over making it possible to issue an additional number of awards in the subsequent fiscal year.

Number of shortage nominations/designations. Approximately 88% of awards have been issued to veterinarians filling Types I and II shortages with the remaining awards going to veterinarians filling Type III shortages. Veterinarians may apply for one shortage situation per year; a list of designated shortage areas for 2015 is available on NIFA's website [VMLRP Shortage Situations](#).

Quality of applicant-situation match. Once shortage situations are designated, the success of an applicant rests on the merits of the application and the quality of the match between the applicant and specific needs in the proposed shortage area. Applications are evaluated by review panels composed of veterinarians, veterinary medical school faculty, and individuals from other stakeholder groups. Reviewers consider three factors when rating each applicant: 1) their qualifications and capacity to mitigate a veterinary shortage situation; 2) the severity of the shortage; and, 3) the probability that the applicant will achieve full employment and professional success during and beyond the period of the award. Applicants must also present

a viable business or career plan and explain how they will achieve their career objectives and address the specific needs identified in the shortage description.

Table 1. VMLRP applications, awards, and funding, 2010 – 2014				
Year	Number			Total funds awarded (\$)
	Applications reviewed	Awards offered	Agreements executed¹	
2010	159	62	52	5,185,978
2011	257	80	75	7,250,970
2012	140	50	45	4,448,652
2013	140	47	43	3,838,128
2014	163	52	49	4,360,121
Total	859	291	264	\$25,083,849

¹NIFA executes fewer agreements than awards offered because some veterinarians do not accept awards.

Debt repayment support

While the minimum debt threshold to qualify for the program is \$15,000, the majority of VMLRP awardees (2010-2014) had incurred educational debts between \$50,000 and \$150,000 (Table 2). Annually, the average debt ranged from \$96,147 to \$129,675. The average indebtedness for all new awardees over the five-year period was \$113,639.

Table 2. Distribution (%) of Awardees with Eligible Veterinary Educational Debt by Year				
Year	Debt Amounts of New Awardees			
	Under \$50,000	\$50,001 - \$100,000	\$100,001 - \$150,000	Over \$150,000
2010	4	53	36	7
2011	9	40	30	21
2012	11	29	55	5
2013	3	42	49	6
2014	11	27	35	27

Renewals became an option in 2013 when veterinarians who accepted awards in 2010 completed their three-year commitment. Veterinarians who seek to renew their awards must explain how they have helped address their specific shortage situation, provide evidence of their ability to continue mitigating the shortage, and hold at least \$15,000 in remaining eligible debt. Renewal applicants compete with new applicants for awards. The length of a renewal depends on the amount of remaining debt and must entail a commitment of at least one year, but not to exceed three years. For example, a veterinarian with \$30,000 in eligible debt may accept a two year award of \$15,000 each year or a one-year award of \$25,000 (the maximum allowed annually). Duration of renewal awards is at the discretion of NIFA. Applications for second renewals are allowable.

The high levels of debt shown in Table 2 may explain why more than one third of awardees in the 2010 and 2011 cohorts applied for renewals. Of the 52 veterinarians who received an award in 2010, 22 applied for a renewal in 2013 and 11 received awards. Of the 75 veterinarians who received an award in 2011, 27 applied for a renewal in 2014 and 13 received awards.

Meeting the Needs of Shortage Situations

Animal health officials in State and Federal governments, including the District of Columbia and the U.S. Insular Areas, have the authority to nominate geographical areas or public sector positions as shortage situations. Shortage nominations must specify the location and types of animals the awardee will service, explain why the shortage needs to be mitigated, describe previous efforts made to recruit or retain a veterinarian, and identify the risks that will exist should the area not secure a veterinarian. Shortage nominations must also be classified as critical, high, or moderate priority.

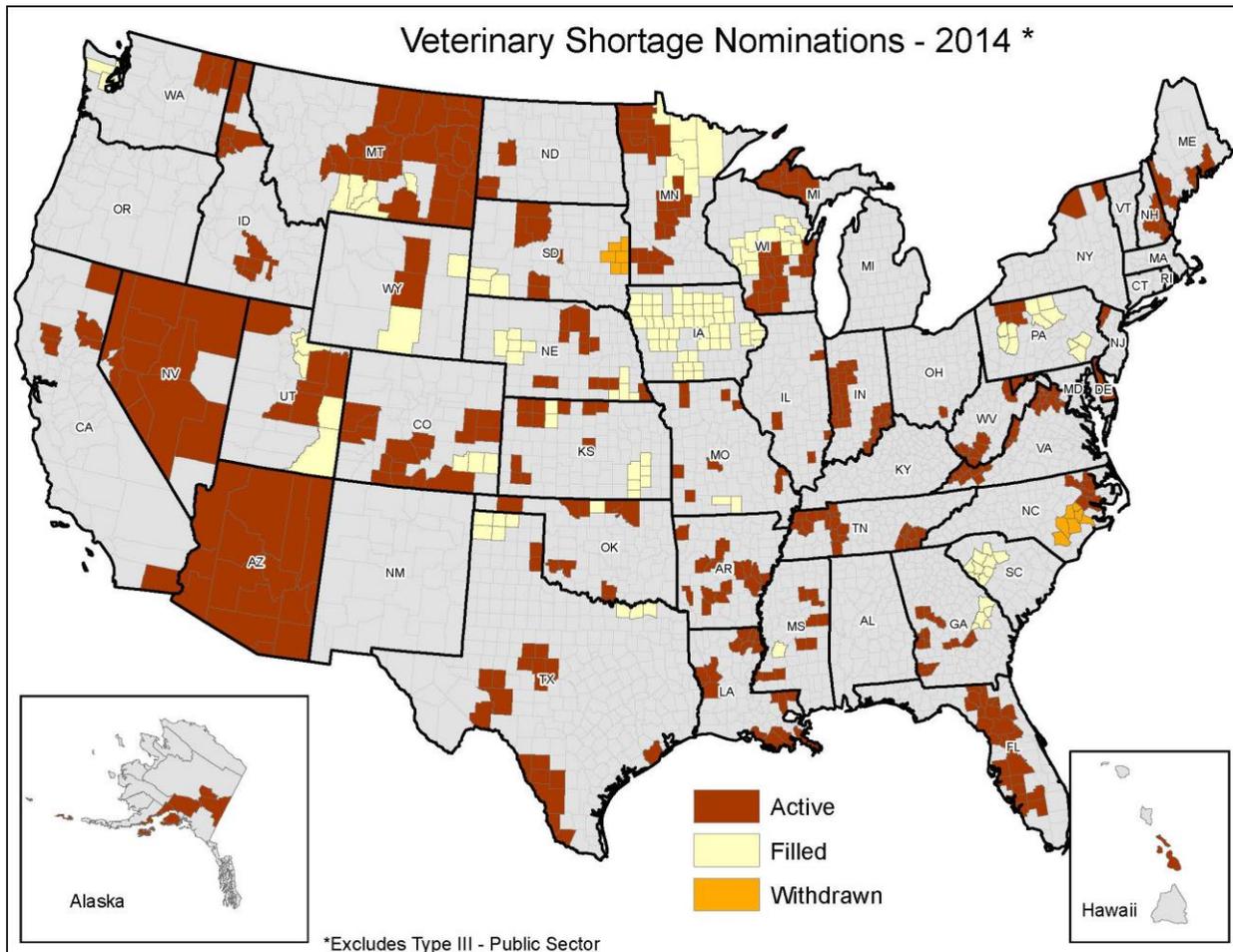
The majority of nominations are submitted by SAHOs who, along with counterparts in Federal and other jurisdictions, identify approximately 210 shortage situations each year. NIFA determines the maximum number of nominations each state may submit based on agricultural data collected by USDA's National Agriculture Statistical Service (see Appendix 2 for state allocations). Specifically, NIFA focuses on two variables that correlate with demand for food supply veterinary service: 1) livestock and livestock product total sales (\$), which indicate the extent of live animal agriculture in a state; and 2) land area in acres, which predicts the need for veterinary service based on a positive correlation between state land area, percent of state area classified as rural, and percent of land devoted to actual or potential livestock production. Land area also predicts the number of veterinarians needed in a state due to the practical limitations of operating a mobile veterinary practice.

NIFA has limited the number of shortage situations each state or entity can nominate to ensure a fair distribution of awards across states and reduce the burden on SAHOs. NIFA also sought to maximize the percentage of appropriated funds used for making awards by containing the administrative costs associated with external review of nominations.

Within the limit of state caps, SAHOs may nominate new shortage situations or carry over situations successfully nominated the prior year but not filled by an awardee. SAHOs may also rescind prior shortage situations that were nominated but not filled.

The map in Figure 3 shows the location of counties identified by SAHOs as containing Types I and II shortage situations in 2014. The colors indicate whether the shortage area is active, filled, or withdrawn. Areas that are active but have not been filled for 3 or more years are classified as chronic shortages and are discussed later in the report.

Figure 3. Types I and II Veterinary Shortage Nominations, 2014



Source: National Institute of Food and Agriculture; map developed for NIFA by USDA's Center for Epidemiology and Animal Health, Animal and Plant Health Inspection Service.

Shortage nominations undergo review by a panel of Federal and State animal health experts including representatives of state veterinary medical colleges. The reviewers evaluate each shortage nomination based on five criteria (Figure 4) and forward their recommendations to

VMLRP program staff, who, on behalf of the Secretary of Agriculture, make the final determination. Full descriptions of designated shortage situations are posted annually on NIFA’s website for use by applicants and other stakeholders.

III. PROGRAM IMPLEMENTATION AND OVERSIGHT

As fiscal stewards of roughly \$5 million in program funding each year, VMLRP program staff members have established criteria for determining shortage situations of highest priority and competitive processes for selecting awardees. Internal controls help ensure that funds are used appropriately and NIFA complies with all relevant laws. To date, VMLRP has made it possible for almost 300 veterinarians to practice in locations or positions deemed by SAHOs to be important to food animal production and public health. Despite this accomplishment, there are several issues that continue to challenge NIFA’s full and efficient implementation of the VMLRP. These include 1) an emerging set of chronic shortage areas and remaining gaps in veterinary coverage; 2) limited mechanisms for oversight of service contracts; and 3) administrative challenges.

Filling Chronic Shortage Areas and Remaining Gaps

Chronic shortage areas are shortage situations that have been nominated but not filled for four or more years. Some of these chronic shortages exist because applications that were submitted were not successful. Overall, 238 counties in 35 states have had at least one shortage situation that received applications but has remained open (unfilled) for 4 or more years (see Figure 5) Chronic shortage areas also arise when no veterinarians apply to a shortage situation. Forty-one counties in 14 states have been designated for four or more years without attracting any applications. Thirty-seven counties remain active and open in 2015 (see Figure 6).

NIFA recognizes that the guidance it provides to panelists who review applications has a direct impact on the ability of states to fill their chronic shortage areas. The primary criterion for determining awards is the quality of the match between the veterinarian’s knowledge, skills, and experience and the requirements of the shortage situation. Review panels are currently not allowed to consider other factors, such as the number of years a shortage has

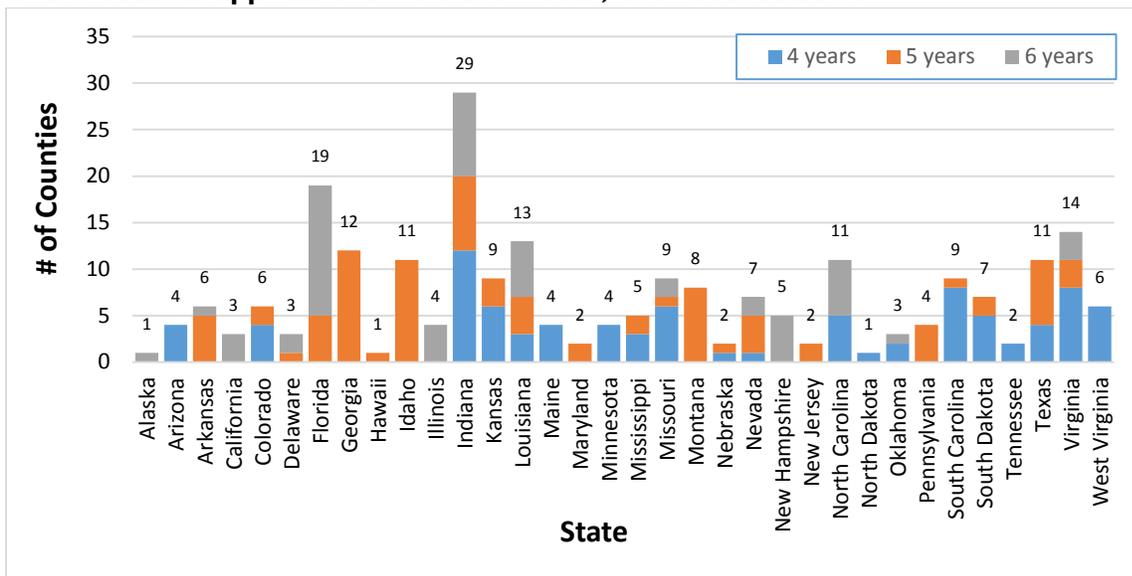
FIGURE 4. SHORTAGE AREA CRITERIA

Shortage nominations that receive a score of 70 or better (out of 100) and a simple majority vote by the review panel are recommended for designation as a shortage situation. Nominations that receive a score below 70 and fail to receive a majority vote are not recommended for designation as a shortage situation. The reviewers use the following scoring criteria:

- (1) The objectives of a veterinarian meeting the needs in the shortage situation and being located in the community, area, state/insular area or position requested (20 points);
- (2) The activities of a veterinarian meeting the needs in the shortage situation and being located in the community, area, state/insular area or position requested (20 points);
- (3) Past efforts to recruit and retain a veterinarian in the identified shortage situation (5 points);
- (4) The risk of this veterinary position not being secured or retained, including risks to the production of a safe and wholesome food supply, and to animal, human, and environmental health in the local community, region, state/insular area, nation and/or international community (35 points); and,
- (5) The overall merit and quality of the case made for the nomination (20 points).

remained unfilled. The intent behind emphasizing the quality of the match is to increase the likelihood that awardees will commit to staying in their area or position beyond the term required by their award, and thus provide a long-term solution to the veterinary shortage that they agreed to address.

Figure 5. Number of counties* with chronic shortages by states and years without an award because applications were submitted, but not successful.

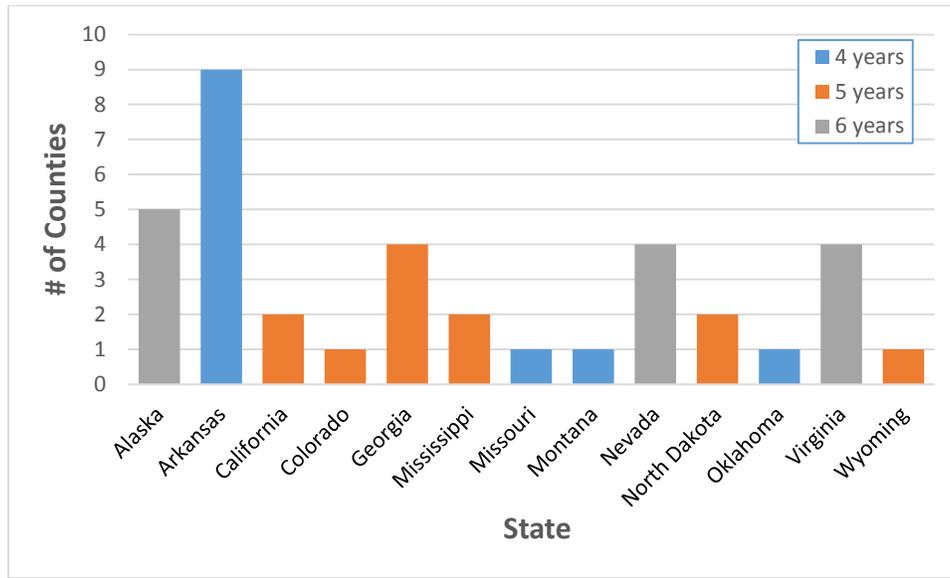


*Counties could have been reported as part of different veterinarian shortage situation nominations. Only a portion of a county could have been designated in the nomination description.

For chronic shortage areas that received no applications, the current level of debt repayment offered by VMLRP may not be a sufficient incentive for veterinarians to relocate and commit to three years of service. When setting up the VMLRP, NIFA sought a balance between maximizing the number of awards (as requested by Congress) and having a large enough incentive to attract veterinarians to fill shortage situations. The current amount of \$25,000 per year is comparable to other Federal educational loan repayment programs.⁸ NIFA has discretion over the amount of debt repayment awarded in exchange for three years of service; modification is possible but would require regulatory changes. In the absence of additional funding from Congress, an increase in the annual loan repayment amount for hard-to-fill shortages would result in a decrease in the total number of veterinarians participating in the program.

⁸ National Institutes of Health’s Loan Repayment Program pays up to \$35,000 each year (<http://www.lrp.nih.gov/>); U.S. Department of Health and Human Services’ National Health Service Corps pays up to \$50,000 for two years (<http://www.nhsc.hrsa.gov/>).

Figure 6. Number of counties* (by state) with chronic shortages for which no applications were submitted.



*Counties may have been reported as part of different veterinary shortage situation nominations. Only a portion of a county could have been designated in the nomination description.

In addition to the chronic shortage areas discussed above, it is likely that additional gaps in veterinary coverage exist that are not currently addressed by VMLRP. The decision to participate in the program is left up to each SAHO, and each year program staff members make every effort to inform these key stakeholders of the program and application deadlines through mass emails, website and federal register notices, and updates to the National Association of State Animal Health Officials. Despite this effort, not every eligible state and Territory chooses to participate.⁹ Notably, some states have stopped participating because their shortage areas have been filled or shortage situations no longer exist due to changing agricultural conditions.

Oversight of Service Agreements

NIFA’s capacity to verify that awardees are abiding by the terms of their service agreements is currently limited. On a quarterly basis (*i.e.*, 12 times during the 3 year award period), awardees are required to submit a verification affidavit stating that they are abiding by the terms of their service agreement. Quarterly loan repayment installments to lenders are not made until such verification is obtained. If the awardee is self-employed, he or she signs the affidavit. If the awardee is employed by a veterinary practice or other business entity, the supervisor must sign the document. A termination report is also required. Conducting more in-depth oversight of service, such as in-person site visits to awardees’ service areas, is cost-prohibitive. Under NIFA’s current policies and operating procedures, and the agency’s interpretation of the Privacy Act, NIFA does not disclose the identity of award recipients to either the public or SAHOs. Thus, NIFA cannot partner with SAHOs to confirm compliance. To expand oversight

⁹ For example, Alabama may submit five shortage nominations each year but has not submitted a nomination since 2012. Massachusetts may submit two nominations but has never participated in the program. See Appendix 2.

capabilities, NIFA has developed a mechanism to validate service agreements through a random audit of service logs. This process is pending public comment and approval by the U.S. Office of Management and Budget.

Administrative Challenges

Administration of the VMLRP is very labor-intensive. Unlike NIFA's grant programs which are supported by electronic systems, the VMLRP application and record keeping processes are almost entirely paper-based. This is because multiple laws and regulations governing the handling of sensitive information within Federal agencies directly affect how NIFA administers, manages, and assesses the VMLRP. Under the Privacy Act,¹⁰ agencies that collect personally identifiable information from members of the public are responsible for protecting that information until it is no longer needed and can be destroyed. NIFA is also obliged to comply with the Paperwork Reduction Act of 1995¹¹ governing the collection of information from members of the public for purposes of monitoring and performance measurement.

Under the Federal Information Security Management Act (FISMA) and the E-Government Act of 2002, the National Institute of Standards and Technology establishes performance standards for the Federal government's information technology (IT) systems to ensure that sensitive information is adequately protected.

Because NIFA's IT system does not meet these standards, and because the Federal government's host site for electronic submission of grant applications (www.grants.gov) does not support loan repayment programs, the VMLRP application process is paper-based rather than electronic. Records are maintained in hard copy format and stored in secured, locked cabinets. The manual processing of applications, awards, and close-out procedures is labor-intensive and inefficient for all parties. NIFA is currently building a new IT system for managing its grants, though it remains uncertain whether the new system will accommodate a loan repayment program.

Another disadvantage of manual processing and use of paper-based forms is that they are not conducive to robust quality control measures. VMLRP staff members maintain basic information regarding awards and awardees in electronic form, but large amounts of information must be entered manually. This system makes data entry errors more likely, and places the burden of updating the information on NIFA staff rather than the awardee. The paper-based system for applications also increases the possibility that documents will be misplaced or not received. Should NIFA attempt to track veterinarians beyond their service period, the lack of a public interface will make this information difficult to collect and maintain. Electronic processing, especially if it were partially automated to flag discrepancies or anomalies, would dramatically increase the efficiency of the program and decrease the risk of administrative errors. It would also enable applicants and awardees to enter data electronically, thus placing the burden of ensuring accuracy on them rather than NIFA.

Programmatic and financial responsibilities of administering the VMLRP are segregated within NIFA. Program staff are responsible for processing applications from veterinarians and SAHOs,

¹⁰ See Privacy Act of 1974, 5 U.S.C. 552a, enacted December 31, 1974; Public Law 104-13, 44 U.S.C. 35, May 22, 1995 – Coordination of Federal Information Policy; 44 U.S.C. 3541.

¹¹ Paperwork Reduction Act of 1995, Public Law 104-13, enacted May 22, 1995.

conducting the external review panels, and closing out service agreements. NIFA's Office of Grants and Financial Management (OGFM) is responsible for processing financial transactions and verifying service. When technical issues regarding service arise, OGFM consults with program staff. NIFA reduces financial risk by releasing loan repayment funds directly to the institutions holding the student loans. The only funds that NIFA releases directly to the awardees are the income tax reimbursement funds.

Recognizing that manual processing makes VMLRP a labor-intensive endeavor, NIFA recently created and filled a Program Coordinator position to support the program. Addition of the Program Coordinator has strengthened the capacity of the program staff significantly and has already resulted in improved process efficiencies such as reformatting the current database to match work-flows, setting up auto-fillable forms within the database, and transitioning forms to pdf-fillable format. The program staff continues to identify opportunities to achieve additional efficiencies, including the creation of standard operating procedures.

IV. The Future of VMLRP and Next Steps

Legislative changes regarding the use of antibiotics for animal production could have a profound impact on the veterinary profession, the food animal industry, and the VMLRP. On June 3, 2015 the U.S. Food and Drug Administration published the Veterinary Feed Directive final rule. This rule eliminates the use of antibiotics for production purposes – such as growth promotion and feed efficiency – and brings all remaining therapeutic uses of antibiotics under the oversight of a veterinarian. Full implementation of the rule is expected by December 2016 and more regulations regarding the use of antibiotics for preventive purposes are anticipated. As a result, it is possible that the demand for veterinary services by livestock producers could increase. The additional oversight required by veterinarians will also increase current workloads, which in turn could lead to increases in veterinary shortage nominations.

Assessing the long-term effectiveness of the VMLRP is an important but challenging goal for NIFA. Constrained by regulations governing the collection of information by federal agencies, VMLRP staff members have been unable to gather feedback from awardees beyond the completion of service. In accordance with government regulations, the VMLRP program staff is developing a survey that will be sent to veterinarians one year after completion of service and every other year after that for up to five years. Participation will be voluntary. Those who do respond will help NIFA determine the long-term impact of the program on veterinary shortage areas. Another option is to create a network or listserv for VMLRP awardees (past and present) to exchange experiences with each other and share job and training opportunities and. NIFA may explore partnerships with veterinary associations to provide this and other platforms for supporting VMLRP alumni.

An even more challenging endeavor is assessing the economic impact of the VMLRP on food animal production. Given the potential of small and backyard farms to spread food-borne diseases, increasing access to veterinary care and education could help small-scale producers maintain healthy animals and prevent the spread of diseases. However, attributing the prevention of such diseases to expanded access to veterinary medical services is difficult to demonstrate. A rise in the number of diagnostic samples submitted to state labs from areas with filled shortages

could indicate an increased level of surveillance. Even anecdotal evidence from awardees located in areas infected by avian flu may help NIFA develop methods for demonstrating the value and impact of the program on food animal production.

Veterinarians play a unique and significant role in maintaining the health and wellbeing of national herds and flocks in the United States and assuring the production of safe, affordable and accessible foods derived from animals. As the “only health discipline with expertise across multiple species and ecosystems,” veterinarians are uniquely positioned to understand and appreciate how human, animal, and environmental systems interact.¹² They are often the first to detect diseases in herds and flocks, and well-positioned to help prevent them. As the global demand for food from animal agriculture continues to rise, U.S. producers will play a significant role in meeting the demand for animal-based products at home and abroad.¹³ The VMLRP delivers multiple benefits beyond helping veterinarians reduce their educational debt load and putting careers in food animal veterinary medicine within financial reach. Access to affordable veterinary services could, for some families, determine whether they remain in farming and continue to provide their local communities with fresh, safe, and healthy animal food products.

¹² Veterinary Medicine Workforce Needs (National Academies Press, 2014): 5.

¹³ The Critical Role of Animal Science Research in Food Security and Sustainability (National Academies Press, 2015): 1.

APPENDICES

Appendix I. Distribution of Employment Types among Graduates of U.S. Veterinary Medical Schools in 2002 and 2013

	2002		2013	
	Number (n=1364)	Percent (%)	Number (n=1802)	Percent (%)
Private Practice	958	70.2	953	52.9
Food animal exclusive	39	2.9	29	1.6
Food animal predominant	40	2.9	46	2.6
Companion animal exclusive	519	38.0	547	30.4
Companion animal predominant	160	11.7	125	6.9
Mixed Animal	146	10.7	165	9.2
Equine and Other Private Practice	54	4.0	41	2.3
Public or corporate	40	2.9	61	3.4
University	10	0.7	6	0.3
Uniformed services	19	1.4	34	1.9
Federal, State, or Local Government	7	0.5	2	0.1
Industry or commercial	3	0.2	6	0.3
Not-for-profit	1	0.1	13	0.7
Advanced education	338*	24.8	788	43.7
Internship	—	—	677	37.6
MPH	—	—	12	0.67
MPVM	—	—	2	0.1
PhD	—	—	16	0.9
Residency	—	—	61	3.4
Other	—	—	20	1.1
Other/Unknown	29	2.1	788	43.7

*Some categories were not broken down by type in 2002.

Sources: "Vet Med Today: Facts & Figures, Employment of male and female graduates of US veterinary medical colleges, JAVMA (2002), 222(5): 598-560; and, JAVMA (2013), 243(8): 1122-1126.

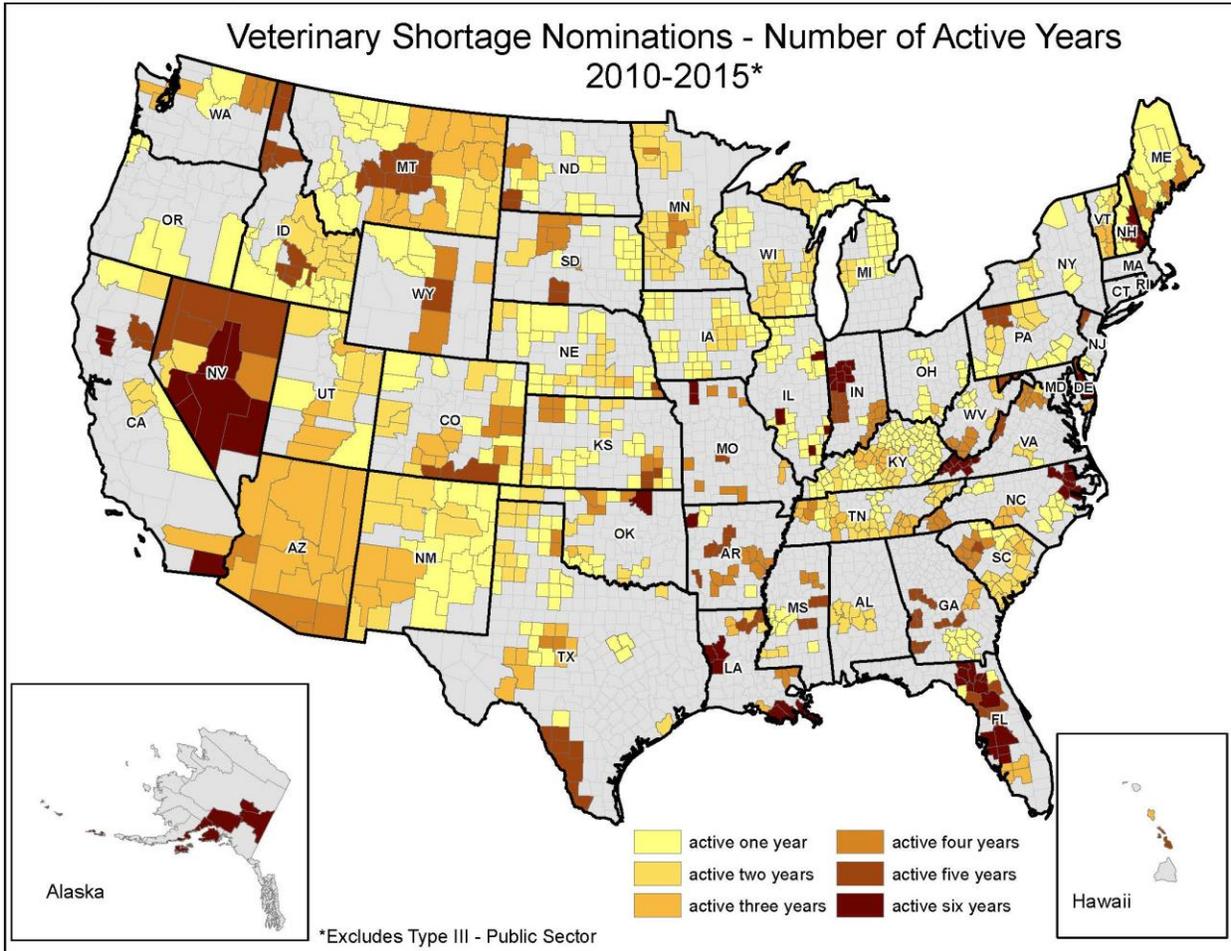
Appendix 2. Allocation of Shortage Nominations by State or Insular Area, 2015

Entity	Maximum Nominations	Entity	Maximum Nominations	Entity	Maximum Nominations
Alabama	5	Kentucky	5	Ohio	5
Alaska	5	Louisiana	4	Oklahoma	7
American Samoa*	1	Maine	2	Oregon	6
Arizona	6	Maryland	3	Pennsylvania	5
Arkansas	6	Massachusetts	2	Puerto Rico	2
California	8	Michigan	6	Republic of Marshall Islands*	1
Colorado	8	Micronesia*	1	Republic of Palau*	1
Connecticut	2	Minnesota	7	Rhode Island	2
Delaware	3	Mississippi	5	South Carolina	3
District of Columbia*	1	Missouri	7	South Dakota	6
Federal Lands	4	Montana	6	Tennessee	4
Florida	4	Nebraska	7	Texas	8
Georgia	7	Nevada	5	U.S. Virgin Islands*	1
Guam*	1	New Hampshire	2	Utah	6
Hawaii	2	New Jersey	2	Vermont	2
Idaho	7	New Mexico	6	Virginia	5
Illinois	6	New York	5	Washington	6
Indiana	5	North Carolina	6	West Virginia	2
Iowa	7	North Dakota	5	Wisconsin	7
Kansas	7	Northern Mariana*	1	Wyoming	6

* Special Consideration entities

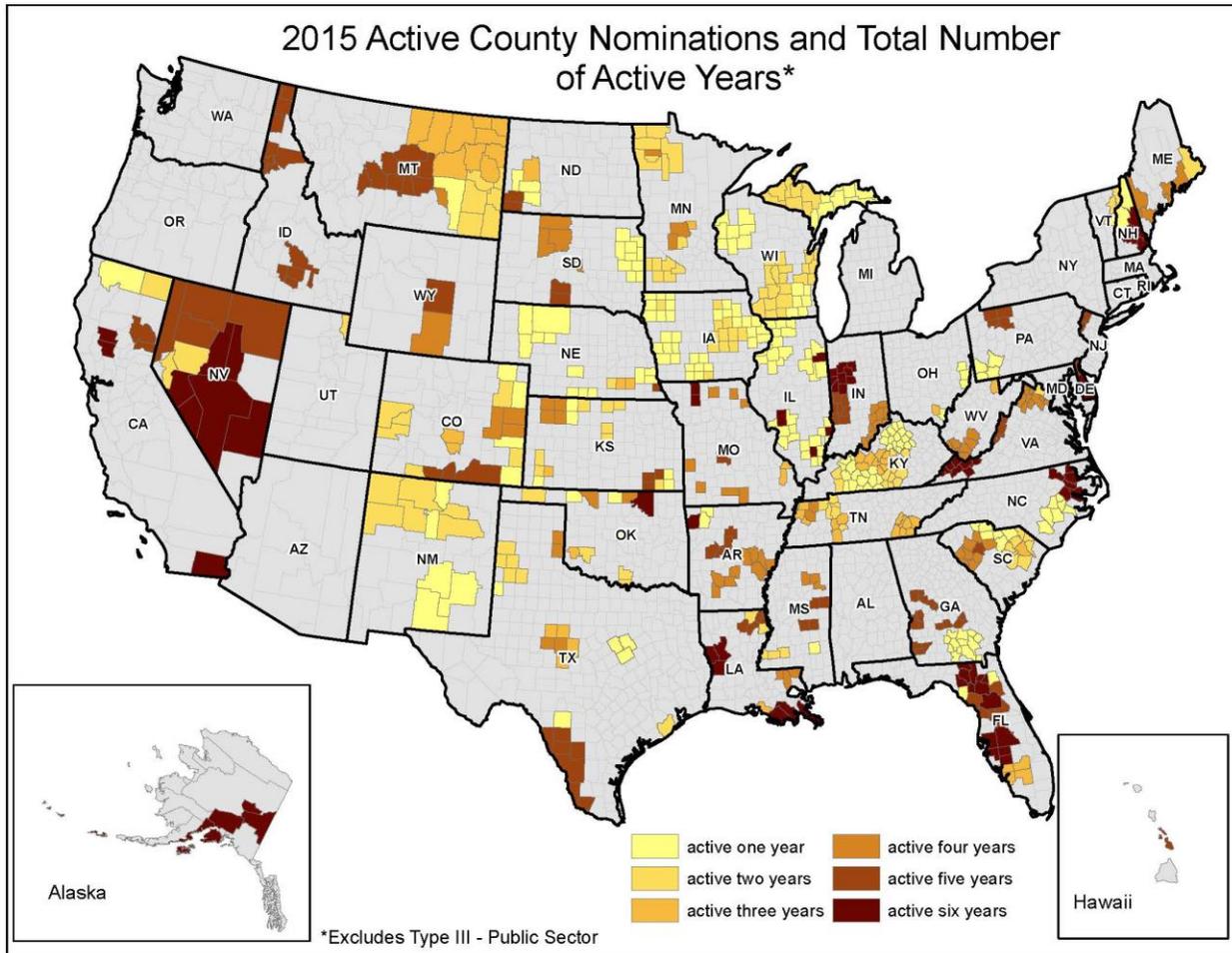
Source: National Institute of Food and Agriculture, 2015.

Appendix 3. U.S. Counties with One or More Active Nominations by Total Number of Years (2010-2015)



Source: National Institute of Food and Agriculture; map developed for NIFA by USDA's Center for Epidemiology and Animal Health, Animal and Plant Health Inspection Service.

Appendix 4. U.S. Counties Active in 2015 with One or More Active Nominations by Total Number of Years (2010-2015)



Source: National Institute of Food and Agriculture; map developed for NIFA by USDA's Center for Epidemiology and Animal Health, Animal and Plant Health Inspection Service.