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Food-animal Veterinarians and the Persistence of Rural Shortage Areas

Brandon Genetin, James C. Davis, and Grace Grossen





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Food-animal Veterinarians and the Persistence of Rural Shortage Areas

Brandon Genetin, James C. Davis, and Grace Grossen

Abstract

Veterinarian services are an important input into food-animal agriculture to help increase animal health and wellbeing, and, in turn, food safety for consumers. However, veterinarian shortages in food-animal and mixed-animal practices have persisted across many U.S. rural areas for more than a decade, despite ongoing Federal and State efforts to address service gaps. Using USDA administrative data, findings show three quarters of U.S. counties have been included in State shortage area nominations to the USDA Veterinary Medicine Loan Repayment Program (VMLRP) at some point between 2010 and 2026. Many counties have appeared multiple times, signaling a long-standing difficulty in recruiting and retaining large-animal and mixed-animal veterinarians. Using data from the American Association of Veterinary Medical Colleges, we find rural students enter veterinary school at rates proportional to their share of the population, yet the geographic distribution of food-animal production creates a greater demand for veterinary services in rural counties than can be met by the existing supply of rural-origin graduates and the economic returns from choosing rural food-animal practice relative to companion animal and urban alternatives. Using data from the American Association of Bovine Practitioners and the American Veterinary Medical Association, this report provides new evidence on the factors contributing to rural veterinarian shortages by examining veterinarian services demand, and the demographic, educational, and practice characteristics of the rural veterinary workforce.

Keywords: Food animal agriculture, rural veterinarians, veterinarian shortages, veterinarian education

Acknowledgements

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About the Authors

Brandon Genetin, James C. Davis, and Grace Grossen are economists with USDA, Economic Research Service.

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A report summary from the Economic Research Service

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Key Points

- The proportion of veterinary school applicants who are rural residents (14 percent) closely matches the percentage of the U.S. population living in rural areas (13.6 percent). Roughly 45 percent of rural applicants receive at least 1 acceptance into a university veterinary medicine program, compared to 49 percent of urban applicants; however, rural applicants apply to fewer schools.
- From 2021 to 2025, average revenue declined 22 percent to \$1.54 million per practice for rural food-animal and mixed-animal veterinary establishments in 2025, a period that saw herds contract. Rural average food-animal veterinarian real income declined 19 percent from 2017 to 2024 and declined 7 percent for rural mixed-animal veterinarians.
- The structure of veterinary services differs substantially by food-animal species. For example, the focus of veterinary care for poultry and swine is on flock and herd health, aided by remote monitoring, rather than on individual animals. Most veterinary shortages center on medical services for beef cattle—animals that can require more intensive, individualized care and treatment.
- State agricultural health officials nominate shortage areas for the USDA Veterinary Medicine Loan Repayment Program (VMLRP), subject to State allocation caps based on land area and food animal sales. In 2024, 69 percent of shortage areas were unfilled, and most received no applications whatsoever (59 percent of shortage areas). Thirty-one percent of shortage areas were filled (a 61-percent increase from a decade before), meaning that an eligible veterinarian applied and accepted the financial assistance award to serve a specific geographic (shortage) area or practice need during the 2024 application cycle. In this same year, 10 percent of shortage areas received applications that were not awarded or accepted.

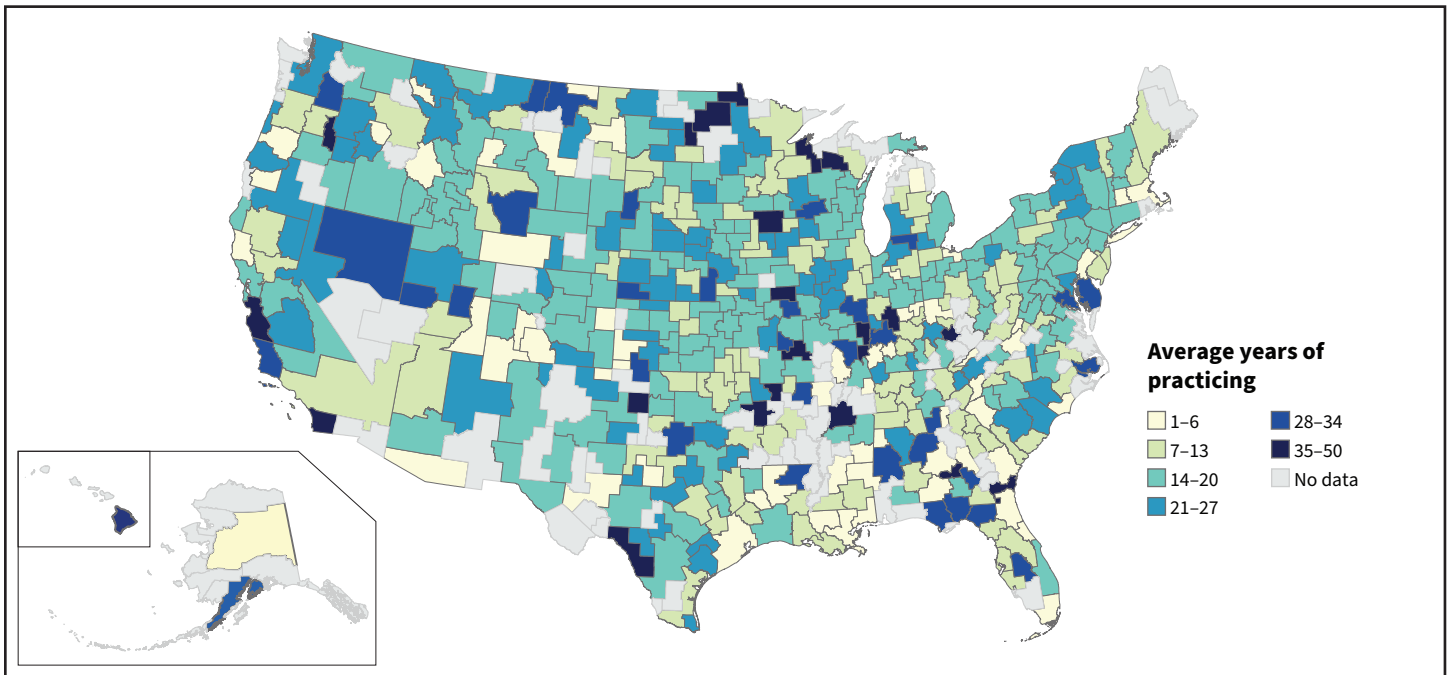
Why Does This Matter?

Veterinarian services are a key input into food-animal production because they ensure animal health, well-being, and, ultimately, food safety for consumers. Food-animal veterinarian shortages can weaken disease prevention, slow emergency response, and heighten risks to both livestock and consumers, creating potential supply chain disruptions. This is largely because veterinarians serve as the frontline defense against diseases and illnesses that can devastate herds. When fewer veterinarians are available, infectious diseases such as

avian flu and bovine tuberculosis can spread more easily and be detected later, increasing the likelihood of major outbreaks. Livestock may also suffer from untreated injuries and diseases such as screwworm, birth complications, delayed emergency care, and higher mortality, which threaten farm profitability. If these challenges become severe, farmers may struggle to meet market and export requirements. Shortages of food-animal veterinarians therefore represent a significant concern for both public health and food security.

A Few More Details

Average years of experience among U.S. bovine veterinarians by commuting zone, 2025



Note: American Association of Bovine Practitioners (AABP) veterinarians include those who self-reported their professional category of employment as related to private practice. Practice years are determined by calculating the difference between 2026 and the individual's graduation year from veterinary medical school. Individuals who graduated more than 50 years ago (approximately 78 years of age and older) are excluded.

Source: USDA, Economic Research Service (ERS) using 2025 American Association of Bovine Practitioners (AABP) membership data and USDA, ERS 2020 Commuting Zone definitions.

Large differences in the professional experience of bovine veterinarians exist across the United States. The map shows the average number of years bovine veterinarians had practiced since veterinary school by USDA, ERS commuting zones, which are collections of counties in a contiguous labor market based on job commuting data and are representative of the distances within veterinarians' practice areas. The median number of bovine veterinarians per commuting zone in 2025 was five (mean was nine). Several commuting zones have no bovine veterinarians (shaded in grey, indicating no data), or if there are bovine veterinarians they are not American Association of Bovine Practitioners (AABP) members and potentially disconnected from the bovine veterinarian practitioner community. These locations are generally commuting zones with fewer cattle producers. The map further indicates that areas with more senior veterinarians (practicing 28 or more years) are geographically dispersed. With few practicing food-animal veterinarians in most labor markets, particularly rural commuting zones, an event such as an individual retirement can have an outsized impact on veterinary service availability. Many veterinarian shortages are localized, and identifying predictors such as veterinarians in the later stages of their professional careers can help stakeholders anticipate expected future shortage areas before they become acute.

ERS is a primary source of economic research and analysis from the U.S. Department of Agriculture, providing timely information on economic and policy issues related to agriculture, food, the environment, and rural America.

Food-animal Veterinarians and the Persistence of Rural Shortage Areas

Introduction

The U.S. animal agriculture industry, which produces meat, eggs, dairy products, and fiber such as wool for both domestic and international markets, is fundamentally dependent on veterinary services to ensure the health and productivity of its herds and flocks. Despite this reliance, there is a persistent and pronounced shortage of veterinarians who work on food animals, particularly in rural regions where the bulk of animal agriculture is concentrated (Neill, 2022a). This shortage reflects the interconnectedness of veterinarian markets (Neill, 2022b) and a significant mismatch between the demand for veterinary services, driven by the needs of food-animal operations, and the available supply of veterinarians willing and able to provide care in these areas.

The available supply of veterinarians that are willing and able to provide care in rural food-animal agriculture remains limited across several interrelated dimensions highlighted throughout our report. One important supply factor is the pipeline of veterinary education: Although the share of veterinary school applicants in rural areas is similar to the share of the U.S. population living in rural areas, this proportionality in supply may not be sufficient, given that the demand for food-animal veterinarians is overwhelmingly concentrated in rural areas (National Research Council, 2013). Additionally, rural applicants to veterinary schools tend to apply to fewer institutions and receive fewer acceptances compared to their metropolitan counterparts. However, their rates of matriculation and graduation closely mirror the rural share of the U.S. population, meaning student bodies at veterinary schools are representative of the national rural-urban composition. Even so, the share of rural applicants does not necessarily meet the heightened need for veterinary services in these regions.

Economic and lifestyle factors also significantly influence the supply of veterinarians willing to serve rural food-animal agriculture. Many veterinary graduates accrue substantial debt during their education, making urban practices or positions focused on companion animals more financially attractive. These opportunities typically offer higher compensation and are in areas with greater amenities that are less isolated than rural practices (Neill et al., 2026; Banse et al., 2025; Wang et al., 2012). The result is an imbalance: Rural areas struggle to attract and retain veterinarians. This is further exacerbated by the geographic remoteness and limited resources of rural communities, which can deter graduates from choosing rural careers.

Throughout our analysis, the dynamics of supply and demand are evident, particularly in the provision of rural veterinary services. Areas experiencing shortages reflect situations where the demand for veterinary care exceeds the available supply, and the definition and targeting of such shortage areas by programs like the U.S. Department of Agriculture's (USDA) Veterinary Medicine Loan Repayment Program (VMLRP) are fundamentally shaped by this supply-demand imbalance. However, the criteria for identifying shortage areas in this program may not always capture the true needs of rural animal agriculture, leading to gaps in coverage and support. For example, the maximum number of designated shortage situations per State (i.e., shortage areas) is capped based on land area and food animal sales per State. This allocation approach reflects the original design of the program to geographically

disperse funding equitably across States (USDA, National Institute of Food and Agriculture (NIFA), 2016). As a result, State Animal Health Officials (SAHO) must prioritize nominations. This often results in the exclusion of some areas with legitimate needs from the final list because of the binding nature of the quotas. To circumvent this, some States have widened the coverage geography of each shortage nomination area to include more counties.¹ This behavior improves the odds of including the home county of a VMLRP applicant with rural roots but creates substantial logistics issues: Coverage locations become too large for service contracts for awarded veterinarians. This underscores the importance of developing more nuanced and accurate methods for measuring and identifying shortages that consider both geographic and sector-specific factors.

This report investigates recent trends in the complex shortage of veterinarians serving rural food-animal agriculture in the United States by examining educational pathways, workforce dynamics, and the growing need for veterinary services. It is prepared in response to the Secretary of Agriculture's Rural Veterinary Action Plan, which calls for a comprehensive analysis of rural veterinary shortages to better understand and address the need for veterinary services in these communities. We begin by exploring veterinary education, analyzing how rural and urban backgrounds influence veterinary school application patterns and acceptance rates during 2022–25, with special attention to the distinct characteristics of remote rural counties compared to those near urban areas. We then turn to the veterinary workforce to investigate the economic challenges confronting rural veterinary practices since 2017, including trends in income, practice revenue, and the ratio of veterinarians to practices. Next, we assess veterinary service demand and the specific demands for food-animal veterinarians, focusing particularly on U.S. operations with cattle—an industry not vertically integrated, unlike poultry and swine, and typically requiring an extensive amount of veterinary care. Finally, we evaluate veterinary shortages and the existing food-animal veterinary shortages between 2010 and 2026, highlighting the VMLRP's role and considering alternative methods for measuring and addressing these shortages. Our detailed analysis aims to inform decisionmakers in the food animal sector about the current status of veterinary care in rural communities.

Data Overview

This report draws on data from four primary sources: (1) the American Association of Veterinary Medical Colleges (AAVMC), (2) the American Association of Bovine Practitioners (AABP), (3) the American Veterinary Medical Association (AVMA), and (4) the U.S. Department of Agriculture (USDA). We detail each of these four data sources below. Table 1 provides a comprehensive listing of all data sources, along with the corresponding years utilized in the analysis.

Throughout this report, unless otherwise stated, the terms rural and nonmetropolitan (nonmetro) are used interchangeably, as are the terms urban and metropolitan (metro). Counties are designated as rural (nonmetro) throughout the report using the 2023 Office of Management and Budget (OMB) metro area definitions (OMB, 2023). Metro areas are defined as broad labor-market areas that include central counties with one or more urban areas with populations of 50,000 or more people. They also include outlying counties that are economically tied to the core counties as measured by labor-force commuting. Nonmetro areas are defined as any areas that do not fall into the metro category (OMB, 2021).

¹ Between 2014 and 2019, annual shortage nominations included approximately 650–700 total counties. From 2020 to 2023, the county total steadily increased each year to a peak of 883. In 2024, SAHO were given the option to designate “must serve” and “may serve” counties for shortage nomination geographies. Total counties rose to 1,041 in 2024 and 1,098 in 2025 and 2026, however “must serve” counties returned to pre-2020 levels. Only 579 of the 1,098 total counties were designated as “must serve” counties in 2025 and 2026.

The AAVMC Applicant Decision Data include all U.S. veterinary school applicant data from 2022 to 2025. Applicant data include each individual's permanent address county, what veterinary schools each applicant applied to, and whether the applications were accepted, denied, or withdrawn from consideration.

The AVMA data include four primary sources of information: the Graduating Senior Survey, the Census of Veterinarians, the Veterinary Practice Owners Survey, and membership data.

- (1) The AVMA's Graduating Senior Survey gathers information annually on demographics, debt, compensation, and the postgraduate plans of students graduating from veterinary schools. Response rates vary by year but typically reach more than 80 percent of all graduating seniors. Approximately one in four veterinary colleges have response rates of 100 percent.
- (2) The Census of Veterinarians gathers information annually on employment, compensation, and wellbeing for current AVMA members by randomly selecting participants from the AVMA membership database. Approximately 2,500–3,000 participants respond, resulting in a yearly response rate between 17 and 20 percent. This report uses information from the 2017 and 2024 waves of the Census of Veterinarians.²
- (3) The Veterinary Practice Owners Survey annually collects information about practice owners and their businesses. All practice owners in the AVMA membership database are invited to participate and approximately 10 percent of practice owners respond annually. This report uses information from this survey for years 2021–25.
- (4) AVMA membership data include information on gender, age, State of residence, employment type and practice-species type of veterinarians, which we use to calculate veterinarian income and shares by practice type.

The AABP data include membership information on age, gender, county, veterinary medical school attended, graduation year, and employment type for all 4,900 active AABP members. We use information from the AABP to illustrate patterns for year 2025 to measure cattle operations per bovine veterinarian and the average years veterinarians have been practicing. The data are not a panel in the traditional sense but do include membership entry and exit information for years prior to 2025. Since 2010, approximately 500 veterinarians join and around the same number exit AABP membership each year. Though not directly comparable, the AVMA membership data show AABP membership is likely to cover most bovine practicing veterinarians.³ AABP also conducts a Graduating Senior Survey of its newer members, and in 2025 found 70 percent of them spent the majority of their childhood in a rural community (AABP, 2025b).

² As seen in table 1, data are also available for 2016 and 2025. However, due to small data cells for some of the veterinarian types, we used the data for 2017 and 2024 to construct an income figure in order to consistently aggregate data for all categories.

³ AVMA membership in 2025 included 3,000 food-animal veterinarians and 5,700 mixed-animal veterinarians, for a total of 8,700 members in food- and mixed-animal practice. Given that food-animal species includes cattle, swine, poultry, small ruminants, and other species—and mixed-animal practice covers these as well as companion, equine, and other animals—it is reasonable that the 4,900 AABP members would include most of the 8,700 AVMA members in food- and mixed-animal practice that focus on bovine animals. The AABP is an allied veterinary organization of the AVMA and reports 77 percent of AABP members were also AVMA members in 2025. AVMA reports that 75 percent of the estimated 133,475 U.S. veterinarians at the end of 2025 were AVMA members (McCulloch et al., 2026).

Table 1

Data sources by year

Data source	2000–2009	2010–2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
AABP Graduating Senior Survey					X	X	X	X	X	X	X	X	
AABP membership	X	X	X	X	X	X	X	X	X	X	X	X	
AAVMC applicant decision data									X	X	X	X	
AVMA Census of Veterinarians			X	X	X	X	X	X	X	X	X	X	
AVMA Graduating Senior Survey				X	X	X	X	X	X	X	X	X	
AVMA membership												X	
AVMA Practice Owners Survey								X	X	X	X	X	
BLS Consumer Price Index (CPI)	X	X	X	X	X	X	X	X	X	X	X	X	X
USDA, ERS Commuting Zones (CZ)							X						
USDA, ERS Rural-Urban Continuum Codes (RUCC)										X			
USDA, NASS Census of Agriculture									X				
USDA, NIFA veterinary shortages		X	X	X	X	X	X	X	X	X	X	X	X
USDA, NIFA applicant award summary		X	X	X	X	X	X	X	X	X	X		

AABP = American Association of Bovine Practitioners; AAVMC = American Association of Veterinary Medical Colleges; AVMA = American Veterinary Medical Association; USDA, NIFA = USDA, National Institute of Food and Agriculture.

Note: The full AABP membership data are for 2025. The prior years of data are for exiting members. The years listed for USDA, Economic Research Service (ERS) and USDA, National Agricultural Statistics Service (NASS) data are those used in the report. Prior years of the data are also available.

Source: USDA, Economic Research Service.

Data from the USDA include information from the Census of Agriculture and the Veterinary Medicine Loan Repayment Program (VMLRP). The Census of Agriculture, produced by the USDA's National Agricultural Statistics Service (NASS), is a complete count of U.S. farms and ranches. The Census of Agriculture measures land use and ownership, operator characteristics, production practices, income, and expenditures. It includes every plot of land that raised or sold, or normally would have sold, \$1,000 or more in agricultural products. The Census of Agriculture is conducted once every 5 years with the last wave in 2022, which is used in this report. The VMLRP, managed by the USDA's National Institute of Food and Agriculture (NIFA), provides up to \$40,000 and up to 39 percent (\$15,600) tax assistance (VMLRP is taxable income) of student loan repayment per year for committing to at least 3 years of providing veterinary services in a designated veterinary shortage area. The amount of annual

loan repayment increased to \$40,000 in 2026, up from \$25,000 per year that was allowed during 2010 to 2025. Data provided for the report include applicant and shortage area data, including application outcomes, for years 2010–26.

This report also utilizes the 2023 Rural-Urban Continuum Codes (RUCC) from the USDA's Economic Research Service (ERS). The RUCC distinguishes U.S. urban counties by the population size of their urban area, and rural counties by their degree of urbanization and adjacency to an urban area. The division of counties is subdivided into three urban and six rural categories, with lower codes indicating higher population counties and higher codes representing lower population counties (USDA, ERS, 2025). We employ the 2023 definitions rather than those from 2013, as most figures in this report are based on more recent data. Although certain figures reflect trends over the past decade, our analysis remains consistent by utilizing uniform codes. Furthermore, there were no substantial changes in nonmetro definitions between the 2010 and 2020 decennial censuses, upon which the RUCC definitions rely (Davis et al., 2022). USDA, ERS Commuting Zones for 2020 are also used. These zones are geographic units of analysis, combining the 3,222 U.S. counties and county-equivalents into 598 distinct labor markets based on commuting flows (USDA, ERS, 2026).

Definitions

Food animal: Animal species that are raised and used for food production or consumption by humans. This includes, but is not limited to, cattle, swine, and poultry.

Companion animal: Animal species used for human companionship, entertainment, service, psychological support, or other similar purposes.

Mixed animal: Typically used to refer to “mixed-animal veterinarians,” mixed animals include both food animal and companion animal.

Veterinary Education

The path to becoming a veterinarian in the United States begins with the competitive process of applying to veterinary schools, a journey shaped by geographic, demographic, economic, and educational factors. This section explores the characteristics of veterinary school applicants and matriculants, highlighting how rural and urban backgrounds influence application patterns, acceptance rates, and eventual practice choices, all of which play a role in shaping the aggregate supply of veterinarians. The section takes a particular focus on rural applicants, as previous research indicates veterinarians with rural backgrounds are more likely to express interest in and ultimately return to rural areas for their careers (Banse et al., 2025; Villarroel et al., 2010; Schmitz et al., 2007). As a result, examining rural applicants provides valuable insight into patterns and trends within the rural veterinary workforce.

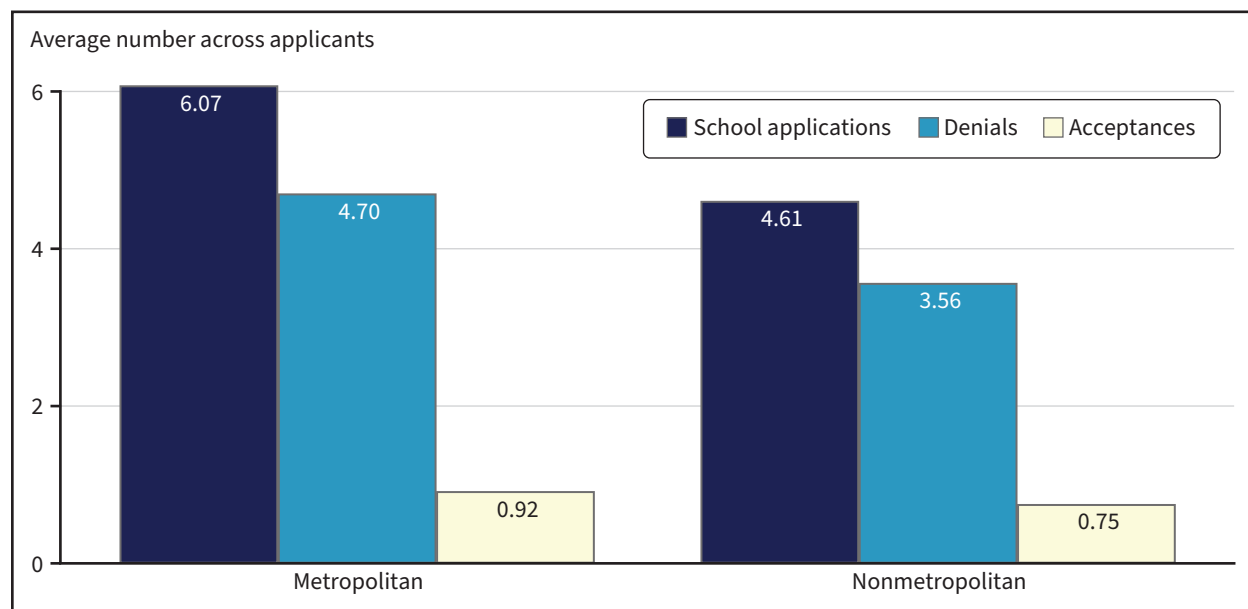
It is important to note that the last 5 years have seen notable developments in veterinary education designed to expand the pipeline for rural and food-animal practitioners. New programs have been established with rural and production-agriculture missions, actively recruiting students from agricultural backgrounds and employing clinical training models tailored to rural practice (e.g., Texas Tech University School of Medicine). Additionally, many established schools have increased class

sizes, further boosting the supply for rural and food-animal needs (e.g., Oklahoma State University, Kansas State University). While these institutions have graduated their first classes, it is still too early to evaluate placement outcomes and their long-term impact on the rural veterinary supply pipeline. Therefore, this analysis does not reflect or evaluate these changes.

The proportion of veterinary school applicants who are rural residents closely matches the percentage of the U.S. population living in rural areas. From 2022 to 2024, about 10,000 U.S. citizens applied to veterinary schools each year, a number that increased to 11,000 in 2025. Of these applicants, between 1,400 and 1,600 are rural residents (i.e., have a permanent rural address). This equates to approximately 14 percent of the applicant pool, which is marginally higher than the 13.6 percent of the U.S. population classified as rural (Farrigan et al., 2026).

On average, rural applicants apply to fewer veterinary schools than their urban peers and experience fewer denials and acceptances. Rural applicants applied to approximately 4.6 schools in 2025 on average, almost 1.5 fewer schools than urban applicants (figure 1). Rural applicants applying to fewer schools also translates to lower average rejections (3.56) and lower average acceptances (0.75) than their urban peers (4.70 and 0.92, respectively). However, the probability that any individual application results in an acceptance from a rural applicant is 16.2 percent, 1 percentage point higher than an urban applicants' 15.2 percent (not depicted in figure 1).

Figure 1
U.S. veterinary school applications and outcomes, 2025

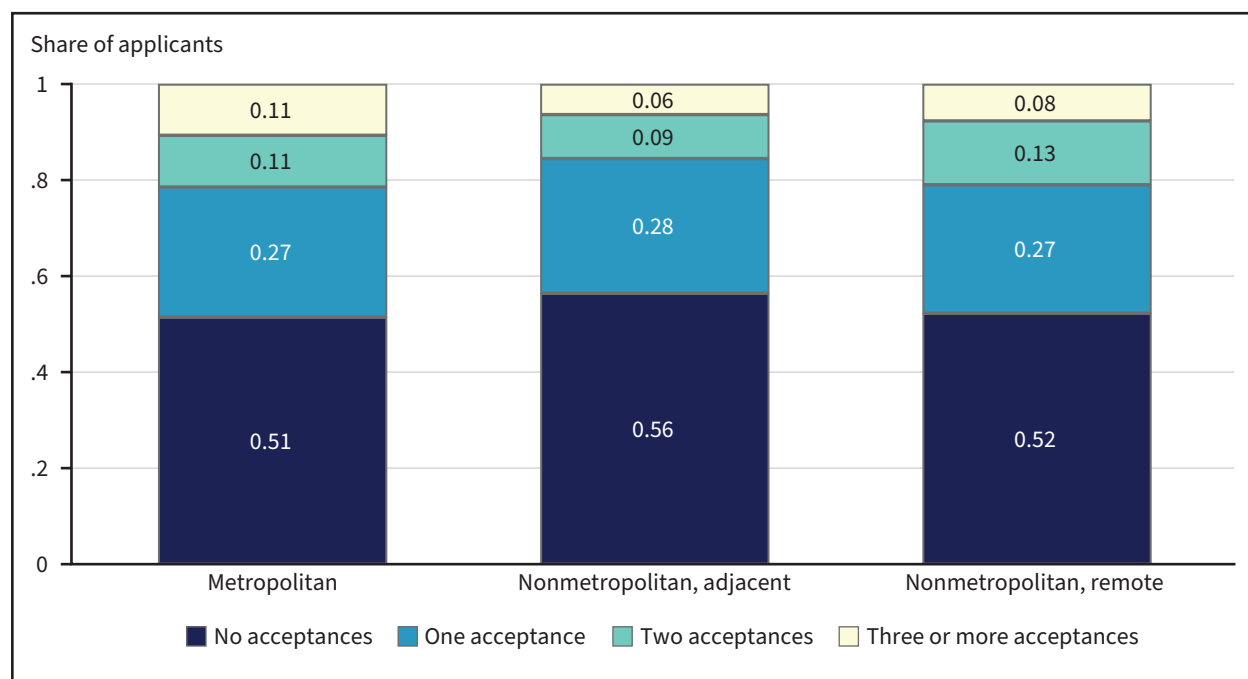


Source: USDA, Economic Research Service using 2025 American Association of Veterinary Medical Colleges Applicant Decision Data.

While individual application outcomes shed light on the likelihood of acceptance for rural and urban applicants, examining overall acceptance rates by geography further illustrates how location influences veterinary school admissions. While it is true that a single acceptance is sufficient for entering veterinary school, reporting the number of acceptances offers valuable context beyond what a simple acceptance rate can provide. Many applicants apply to multiple schools and receiving more than one acceptance allows them greater flexibility to choose the program that best fits their academic, geographic, and financial preferences. By analyzing the distribution of acceptances, such as whether applicants receive one, two, or several offers, we can better understand differences in the choice sets available to rural and urban applicants.

Figure 2 examines acceptance rates in 2025, showing 49 percent of urban applicants received at least one acceptance, compared to 45 percent of rural applicants. Using USDA, ERS’s Rural-Urban Continuum Codes, rural applicants can be further categorized based on county proximity to urban areas. Those from counties adjacent to urban areas (nonmetro, adjacent) had a lower acceptance rate (44 percent) than applicants from more remote rural counties (nonmetro, remote), where 48 percent received at least one acceptance. Rural remote applicants were the most likely group to receive two acceptances (13 percent), and the second most likely to receive three or more acceptances (8 percent), despite applying to the fewest schools on average (4.52). While urban applicants have a slightly higher chance of receiving multiple acceptances (22 percent), this is likely influenced by their tendency to apply to more schools.

Figure 2
Number of acceptances, by geography in 2025



Note: “Nonmetropolitan, adjacent” refers to rural counties that are adjacent to an urban county while “Nonmetropolitan, remote” refers to rural counties that are not adjacent to an urban county. Combining adjacent and remote rural applicants together, the share of applicants with no acceptances is 55 percent.

Source: USDA, Economic Research Service using 2025 American Association of Veterinary Medical Colleges Applicant Decision Data.

Veterinary school matriculation, or the process of enrolling and starting classes, also closely reflects the rural share of the U.S. population. Each year since 2022, between 4,000 and 4,500 U.S. citizens enter veterinary school, and about 14 percent of these students have a permanent rural address. This proportion remained steady from 2022 to 2025. Notably, in-State matriculation rates tend to be higher for rural residents compared to their urban peers (table 2). In 2022, 37.7 percent of urban residents attended veterinary school in State, while the rate was slightly higher for rural adjacent residents at 38.4 percent. Both rates, however, were surpassed by remote rural residents, whose in-State attendance rate was 39.9 percent in 2022. Starting in 2023, the share of rural remote residents attending veterinary school in State increased significantly to 46.8 percent, and this elevated rate persisted through 2025, remaining between 45 and 47 percent. In contrast, the share of students from urban and rural adjacent counties who attended in State stayed in the mid to high 30 percent range, underscoring the tendency of students from the most remote counties to remain in State for their veterinary

education. While the data show higher in-State matriculation rates among rural remote veterinary applicants, the underlying reasons are not clear, and further research is needed to explore why rural remote applicants are more likely to attend veterinary school in State.

Table 2

Share of U.S. in-State veterinarian school matriculations, by geography during 2022–2025

	Urban	Rural (<i>urban adjacent</i>)	Rural (<i>remote</i>)
2022	37.7%	38.4%	39.9%
2023	38.5%	39.4%	46.8%
2024	37.9%	42.4%	45.0%
2025	37.0%	38.8%	46.9%

Note: “Rural (urban adjacent)” refers to rural counties that are adjacent to an urban county, while “Rural (remote)” refers to rural counties that are not adjacent to an urban county.

Source: USDA, Economic Research Service using 2025 American Association of Veterinary Medical Colleges Applicant Decision Data.

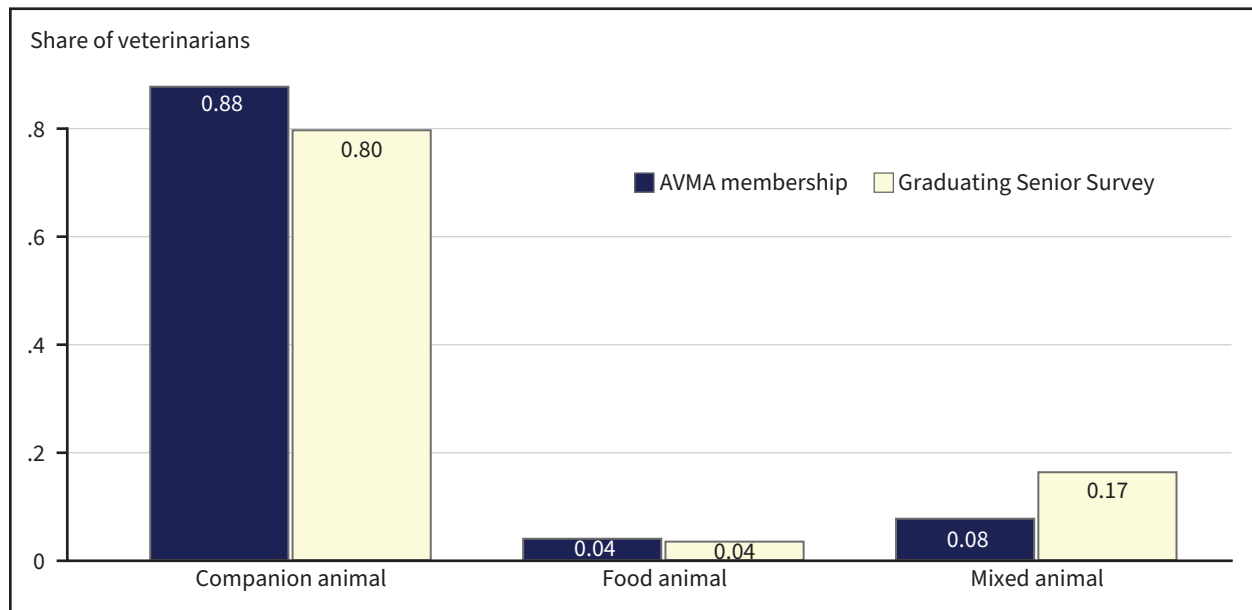
From 2022 to 2025, approximately 4,000 to 4,500 students graduated from U.S. and Caribbean veterinary schools annually, with most of the graduates entering private practice after graduation.⁴ According to data from the AVMA’s 2025 Graduating Senior Survey, 65 percent of new graduates intended to enter companion animal, food-animal, or mixed-animal practice (i.e., practices that provide care for both food, companion, equine, and other).⁵ Notably, the proportion of graduating seniors in 2025 choosing mixed-animal practice was higher relative to the composition of established AVMA members in 2025 (figure 3). For instance, out of the 65 percent of new graduates entering companion animal, food-animal, and mixed-animal practice type positions (excluding internships), 80 percent planned to work in companion animal medicine, substantially less than the 88 percent reported among AVMA members working in food animal, companion-animal, and mixed-animal practice. Of these three practice types, the share of graduates entering mixed animal practice was 17 percent, significantly higher than the 8 percent observed among AVMA membership working in mixed-animal practice types. Meanwhile, food-animal practice remained steady at just 4 percent for both new graduates and among AVMA members working in food-animal practice types, indicating the decline in companion-animal practice was not being offset by an increase in dedicated food-animal practice, but rather by a rise in mixed-animal practice.

A caution in interpreting these results is that a majority of the remaining new graduates indicated plans to take an internship (29 percent). In 2025, among graduates pursuing internships, only 2.1 percent were entering food-animal internships and 1.5 percent were entering mixed-animal internships (McCulloch et al., 2026). Common reasons given by graduates for pursuing an internship included doing so to practice better quality veterinary medicine, plans to apply for residency, an interest in more training, an internship requirement for a desired position, and to increase future earnings. As such, most new graduates entering food-animal and mixed-animal practice types do so through employment, rather than through internships. Naturally, job choice and practice type affect starting salary (Neill et al., 2017).

⁴ Attrition and failure-to-graduate rates at U.S. institutions are typically small (less than 10 percent), with total graduates closely tracking to cohort sizes.

⁵ The remaining 35–40 percent of new graduates state their intention to enter an internship (clinical or academic), practice for equine animals, continue with advanced education, or pursue other veterinary employment.

Figure 3
Share of U.S. veterinarians, by species practice, 2025



Note: Denominator equals the sum of companion, food, and mixed animal categories.

Source: USDA, Economic Research Service using American Veterinary Medical Association, 2025 Graduating Senior Survey and membership data.

While the proportion of rural applicants and veterinary students aligns closely with the rural share of the U.S. population, the unique demands of food-animal practice suggest a need for greater representation from rural backgrounds. Given that farms and ranches are predominantly located in rural areas, the supply of food-animal veterinarians can only meet demand if rural students are represented beyond their population share. A 2025 survey of the American Association of Bovine Practitioners revealed that more than 70 percent of respondents spent most of their childhood in rural communities (AABP, 2025a), reflecting a broader feature about the geography of food animal veterinary supply. Ultimately, the shortage of rural veterinarians is not only driven by an insufficient number of rural students entering veterinary school; rather, it is a multidimensional issue shaped by additional features related to practice-type choice, the economic return of a food-animal practice, and the scale and geographic distribution of rural veterinary needs. This challenge becomes especially pronounced in the veterinary workforce, where the gap between supply and demand begins to emerge.

Veterinary Workforce

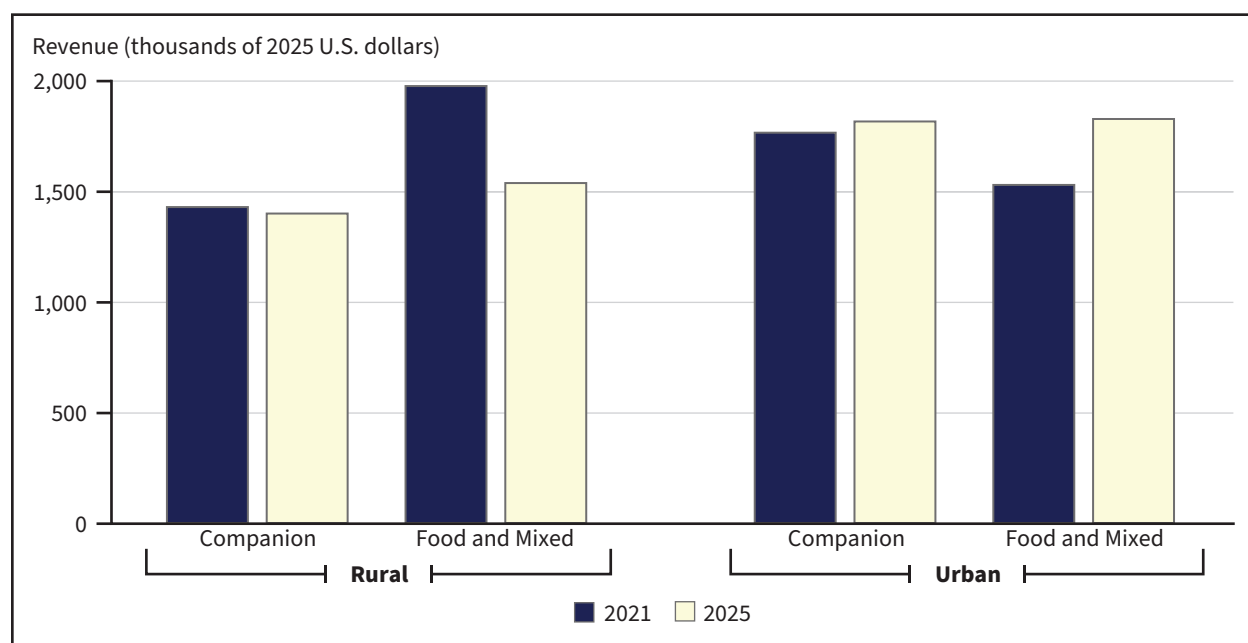
This section overviews trends in the veterinary workforce into which Doctor of Veterinary Medicine (DVM) graduates enter. The U.S. veterinary workforce consisted of 133,475 veterinarians at the end of 2025, with 27 percent self-reporting to AVMA their residence as rural (McCullock et al., 2026). Calculated using the AVMA 2025 membership data, most veterinarians (89 percent) work in private clinical practice and provide medical services to companion animals (81 percent). Veterinarians in food-animal and mixed-animal practice are critical for the food supply, providing medical services for a wide range of food animals and mitigating animal disease. Given that most of these animals are raised on rural farms and ranches, the state of the rural veterinary workforce is of particular importance to understand veterinarian shortages.

The data referenced in this section are primarily drawn from the AVMA's Practice Owners Survey and the Census of Veterinarians. While these sources reflect AVMA membership, there is considerable overlap between AVMA members and those belonging to large-animal veterinarian organizations. For example, between 2019 and 2026, 74–76 percent of American Association of Bovine Practitioners (AABP) members were also members of the AVMA. Therefore, although AVMA data may not represent the entire large animal veterinary workforce, it does cover the majority of practitioners in this field. Thus, the survey results presented should be interpreted as descriptive estimates that may not fully represent the entire food-animal veterinary workforce.

Recent data indicate rural practices are not thriving. Average rural veterinary practice revenue from 2021 to 2025 declined, in part due to declining food-animal herd sizes. There are fewer veterinarians per practice, and food-animal and mixed-animal average rural veterinarian income has decreased. In addition, difficult working conditions including burnout, particularly for food-animal practitioners, can be attributed to lost revenue (Neill et al., 2022). These developments present headwinds for veterinarians that choose rural food-animal practice (Steinbach, 2025; Neill & Biggs, 2026).

Figure 4

Average revenue per establishment by veterinary practice type and geography, 2021 and 2025



Note: Dollar values have been converted into 2025 dollars using the Consumer Price Index (CPI). Survey response sample sizes for food- and mixed-animal veterinarian practices for 2021 are 36 for rural (nonmetropolitan) and 28 for urban (metropolitan), and 40 rural and 24 urban in 2025. For companion animal practices, there were 124 rural and 531 urban responses in 2021, and 58 rural and 278 urban responses in 2025.

Source: USDA, Economic Research Service using data from the American Veterinary Medical Association (AVMA) Practice Owners Survey, 2021–25, and U.S. Department of Labor, Bureau of Labor Statistics, Chained Consumer Price Index (C-CPI-U).

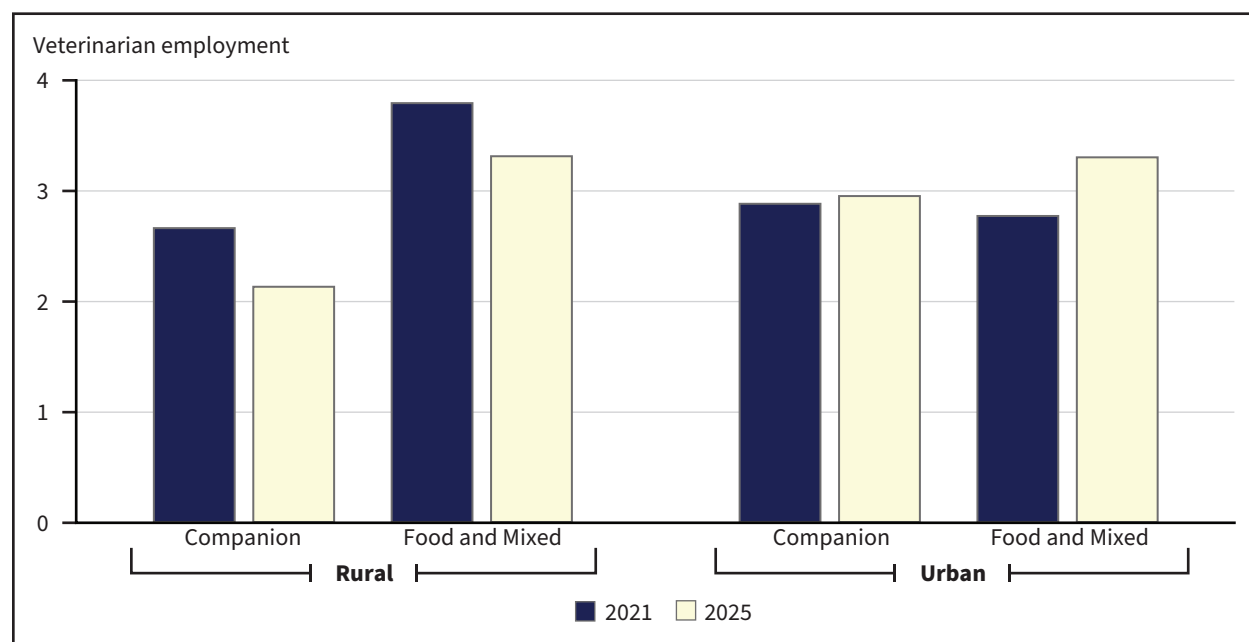
Figure 4 shows the average revenue generated for veterinary practice establishments (by practice owners, veterinarian associates, and staff) by practice type and rurality. While average revenue increased for urban food-animal and mixed-animal practice over the period from 2021 to 2025, revenue has decreased for rural practices from \$2 million to \$1.5 million on average. With the exception of a dip in 2022 due to the Coronavirus (COVID-19) pandemic, declines were steady from 2021 to 2024. A 22-percent revenue decline over 4 years has put financial pressure on rural food-animal and mixed-animal veterinarian medical practices. Though rural companion animal practices are smaller

on average (\$1.4 million in 2025) in comparison to urban companion animal service establishments (\$1.8 million), neither urban nor rural companion animal practices have experienced the revenue declines seen for rural food- and mixed-animal practices. Further, in contrast to rural areas, average revenue for urban food- and mixed-animal practices increased 19 percent.⁶ Overall, practice revenue increased for both types of urban veterinary practices and decreased for both types of rural practices.

Turning to veterinarian employment, figure 5 shows the average number of full-time equivalent (FTE) rural veterinarians per practice declined in both companion animal and food-and-mixed animal practices by 20 and 13 percent, respectively, from 2021 to 2025.

Figure 5

Average number of full-time equivalent veterinarians per establishment by practice type and geography, 2021 and 2025



Note: Veterinarian average employment figures are for independent clinics. Corporate companion animal clinics are not included in the survey. Survey response sample sizes for food- and mixed-animal veterinarian practices for 2021 are 39 for rural (nonmetropolitan) and 30 for urban (metropolitan), and for 2025 there are 44 rural and 25 urban responses. For companion animal practices, there were 131 rural and 568 urban responses in 2021, and 64 rural and 303 urban responses in 2025.

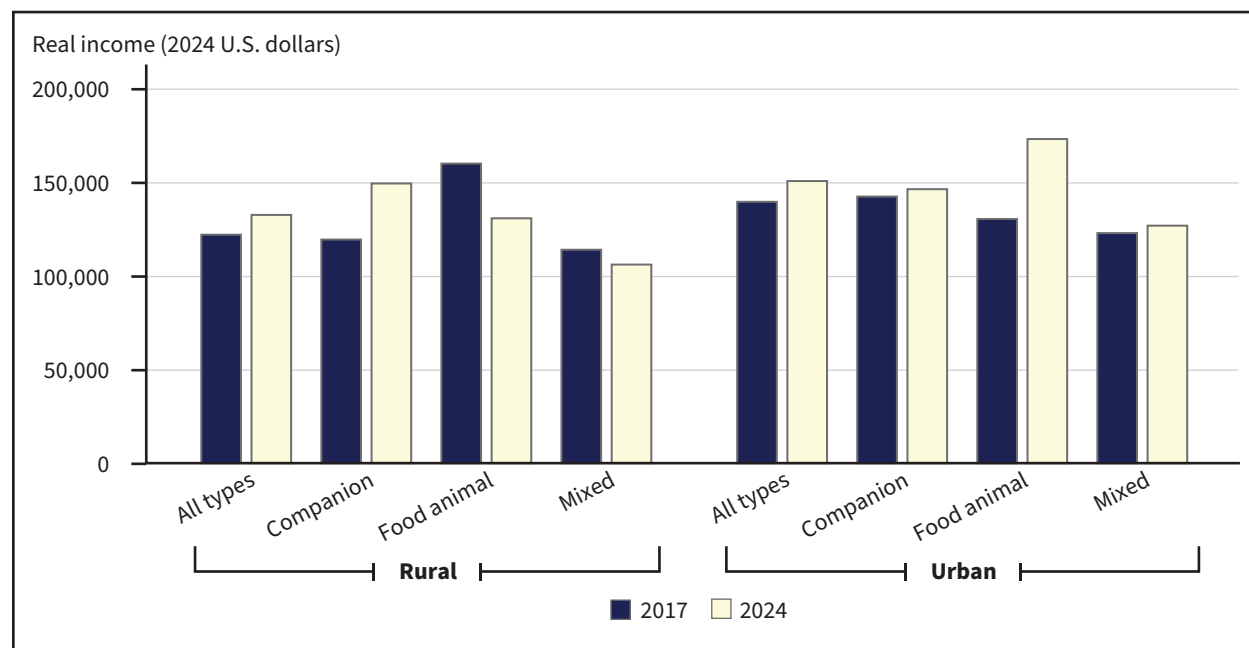
Source: USDA, Economic Research Service using data from the American Veterinary Medical Association (AVMA) Practice Owners Survey, 2021–25.

Consistent with the recent reductions in rural practice revenues and employment between 2021 and 2025, real income for veterinarians practicing in food-animal and mixed-animal medicine also declined. In particular, income for rural food-animal veterinarians declined by 19 percent from 2017 to 2024 (figure 6). Average incomes for rural veterinarians working in mixed-animal practices were lower than those working in all other practice types in 2017 and 2024 and declined 7 percent by 2024.⁷

⁶ Almost twice as many responses from rural practices were received in comparison to urban practices in the 2025 AVMA Practice Owners Survey for food- and mixed-animal veterinary medicine service establishments.

⁷ While average incomes are plotted in figure 6, the descriptive trends would be unchanged if we instead used median income. In these samples, median income is very similar to average income because veterinary practices are both small and numerous.

Figure 6

U.S. veterinarian per-capita annual income by practice type and geography, 2017 and 2024

Note: Dollar values have been converted into 2024 dollars using the Consumer Price Index (CPI). Survey response sample sizes for food animal veterinarians for 2017 are 32 for rural (nonmetropolitan) and 27 for urban (metropolitan), and for 2024 there are 14 rural and 16 urban responses. For mixed animal veterinarians, there were 62 rural and 52 urban responses in 2017, and 58 rural and 36 urban responses in 2024. For companion animal practices, there were 125 rural and 1,063 urban responses in 2017, and 153 rural and 1,326 urban responses in 2024.

Source: USDA, Economic Research Service using data from the American Veterinary Medical Association (AVMA) 2025 Census of Veterinarians, and U.S. Department of Labor, Bureau of Labor Statistics, Chained Consumer Price Index (C-CPI-U).

Three notable observations for the rural food-animal veterinarian labor force are apparent when comparing rural and urban veterinarian wages in 2017 and 2024. First, real average income increased at rural companion-animal and all urban practice types between 2017 and 2024. Real annual wages for urban food-animal practices increased almost 30 percent in this 7-year period to \$174,000 in 2024.⁸ Second, though rural companion-animal veterinarian incomes have caught up to their urban counterparts, this has not been the case for those working in either food-animal or mixed-animal practices. Third, in 2024, veterinarians that preferred rural residence could earn more, on average, in companion-animal practice than by providing veterinary services for food animals, which was not the case in 2017.⁹

The next section of the report explores the demand side of the veterinary services industry. Given the observed differences in veterinary practice financial performance between urban and rural places, a better understanding of both species' differences and spatial differences in the demand for veterinary services enhances our understanding of veterinarian shortages.

⁸ Some of the subsample sizes are relatively small in the Census of Veterinarians. For example, performing an independent samples t-test for the 2017 and 2024 mean wage for urban food-animal veterinarians passes at the 10-percent level but not at the 5 percent level, with degrees of freedom equal to 41.

⁹ It should be noted that the DVM degree provides broad licensure to practice veterinary medicine on any animal species. Species-specific distinctions arise through postgraduate training and professional specialization, not through the degree itself.

Veterinary Service Demand

To support a private veterinary practice, there must be local demand for veterinary services. This section looks at the areas of the country where the animal agriculture industry drives demand for mixed-animal and food-animal veterinary services.

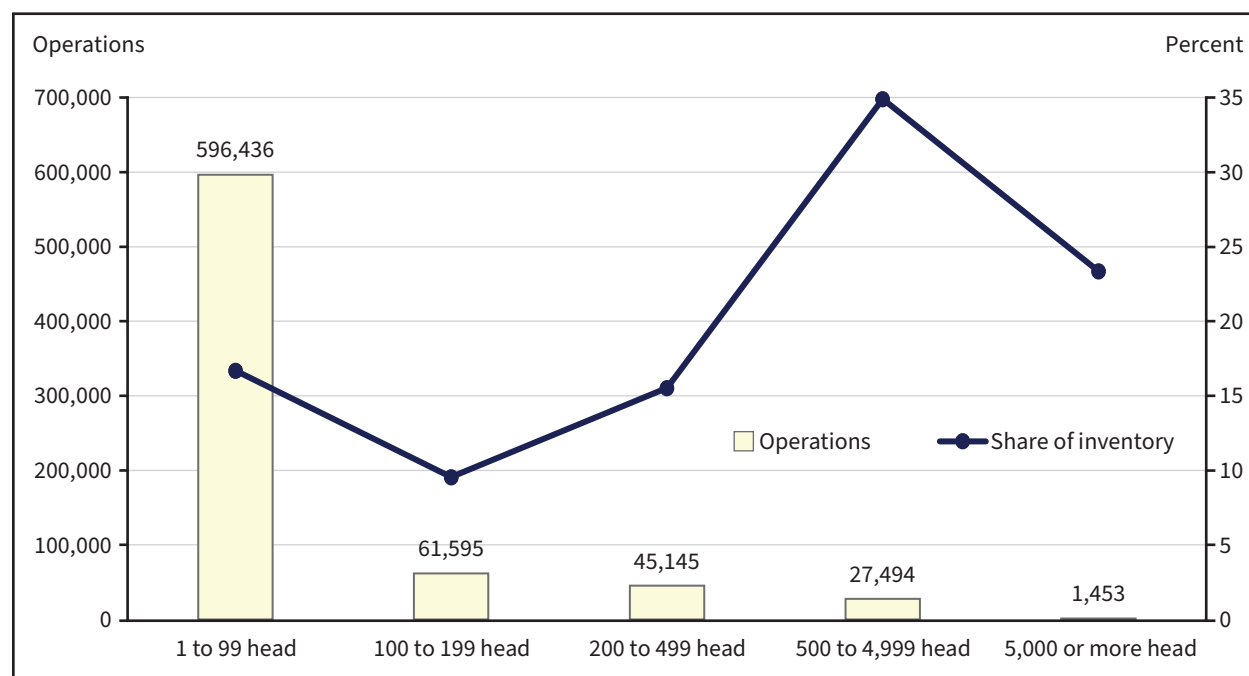
In 2022, there were more than 700,000 farm operations with cattle or calves, more than 60,000 farm operations with hogs, more than 88,000 farm operations with sheep and lambs, and more than 273,000 farm operations with poultry in the United States (USDA, NASS, 2022). All these food animals require veterinary services at some stage of their lives. These services include anything from assessing soundness for breeding, checking pregnancies, and assistance with birthing to diagnosing and treating illness and disease (National Research Council, 2013). The varying structures of each food-animal industry influence how the animals receive veterinary services just as much as the varying biology of the species.

Poultry, including chickens and turkeys raised for meat, are produced in highly vertically integrated systems in the United States. In the case of broiler chickens, an integrating company owns the animals at each stage of production, from start to finish. These companies contract farmers to raise their birds for them (MacDonald, 2014). Poultry integrators take blood and tissue samples from the birds periodically to monitor the health of the flocks. Their focus is on flock health rather than on individual animals as a single house may contain thousands of birds, with each individual animal being of low monetary value. As a result, much of the veterinary services for poultry can be done remotely by analyzing lab results and food and water consumption data (Butcher, 2025). Given that highly pathogenic avian influenza and other infectious poultry diseases are a consistent major issue for the industry (Ramos et al., 2017), this also helps maintain biosecurity by minimizing the number of people traversing multiple poultry operations (e.g., an individual veterinarian can cover many birds over a large area without extensive travel). These veterinarians are also likely to be employed by the integrating company (the owner of the birds) rather than work in their own private practice. However, private-practice services are still prevalent in poultry food-animal production and for independent farms.

Similar drivers exist in the U.S. pork industry. The pork industry is not as vertically integrated as the poultry industry (MacDonald et al., 2018), but more pork producers have been moving towards a herd health and remote service model. There are also various infectious diseases threatening the health of the hog herd. For reasons of biosecurity, hogs are often raised entirely indoors in what are termed all-in, all-out systems where age-group cohorts stay together. Remote veterinary services are also common in this industry.

In contrast, the beef and dairy domestic cattle industries are not vertically integrated. While animals may change ownership multiple times between calving and slaughter, those owners are farmers as opposed to integrators (Gillespie et al., 2023). While the largest cattle operations have been growing in size and shrinking in number, the roughly 700,000 operations with fewer than 500 head still account for more than 36.7 million cattle and calves (41.7 percent of all cattle and calves counted in the 2022 Census of Agriculture). Conversely, there were only about 29,000 farms with inventories of cattle and calves of more than 500 head in 2022, yet they accounted for 58.3 percent of all cattle and calves in 2022. As summarized in figure 7, while most cattle are on large operations, the majority of cattle operations are small. The necessity of travel to many separate operations, regardless of their size, increases the demand for veterinarian services (all other things equal). For this reason, our analysis considers the number of cattle farms per veterinarian in a given area rather than the number of animals.

Figure 7
U.S. cattle operations by size and share of inventory, 2022



Note: The operations with inventory of cattle and calves counted in the Census of Agriculture include ranches, cow-calf operators, back-grounders, feedlots, dairy operations, and any other operation with cattle or calves.

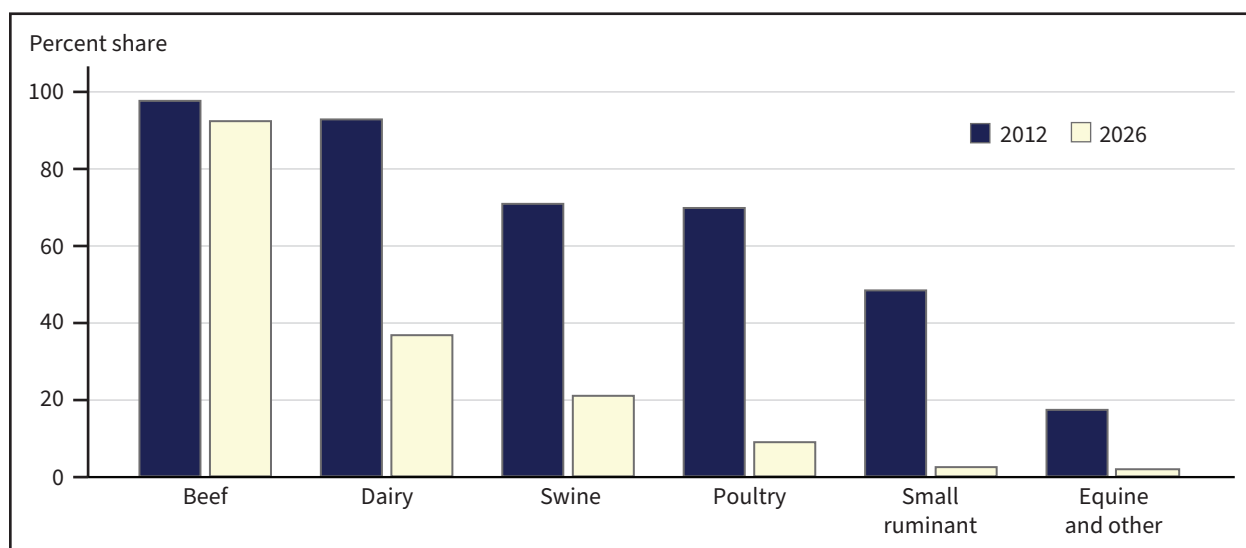
Source: USDA, Economic Research Service using data from USDA, National Agricultural Statistics Service, 2022 Census of Agriculture.

Veterinarians serving beef and dairy operations perform services including castration, dehorning, reproductive services, and diagnostic investigation (Thomson et. al., 2017). Some of these services are required on a seasonal basis (National Research Council, 2013), so all the producers in an area need services around the same time, while in other parts of the year demand for veterinary services may be less pronounced. The structure of the beef cattle industry and the way these operations use veterinary services suggest that cattle are a source of greater demand for veterinary services from private practices than the swine and poultry industries. Administrative data from the Veterinary Medicine Loan Repayment Program (VMLRP) also suggest that this sector is a primary source of need for veterinary services.

VMLRP, administered by USDA, NIFA, is a program designed to help veterinarians offset the debt incurred from their veterinary medical education in exchange for serving in veterinary shortage areas for a determined period of time. It was authorized by the National Veterinary Medical Services Act (NVMSA). Selected veterinarians received \$25,000 per year for student loan repayment for a 3-year service agreement. The shortage areas are identified by State animal health officials (SAHOs). The program allows the SAHO to identify “must serve” species to characterize the need of the shortage areas. In 2012, almost all the shortage areas identified for the program required the recipient to serve beef cattle, but a majority also required that they serve dairy cattle, swine, poultry, and small ruminants. In 2026, the share of shortage areas requiring the recipient to serve beef cattle remained high, while requirements to serve the other species fell away (figure 9).¹⁰ This indicates that the beef industry has been identified by the States as the sector with the greatest unmet demand for veterinary services.

¹⁰ USDA, NIFA did adjust the VMLRP program in 2013 to permit SAHO to designate species as “may serve” as an additional option to “must serve,” which may have accounted for part of the change. Nevertheless, by 2026, shortages of veterinary services were dominated by beef cattle needs.

Figure 8
VMLRP shortage areas “must serve” animal types, 2012 and 2026



VMLRP = Veterinarian Medicine Loan Repayment Program.

Note: Small ruminants include sheep and goats. The equine category includes horses, donkeys, and mules, while “other” includes many other animals such as bison, camelids, cervid, elk, llamas, reindeer, yak, and fish.

Source: USDA, Economic Research Service using data from USDA, National Institute of Food and Agriculture.

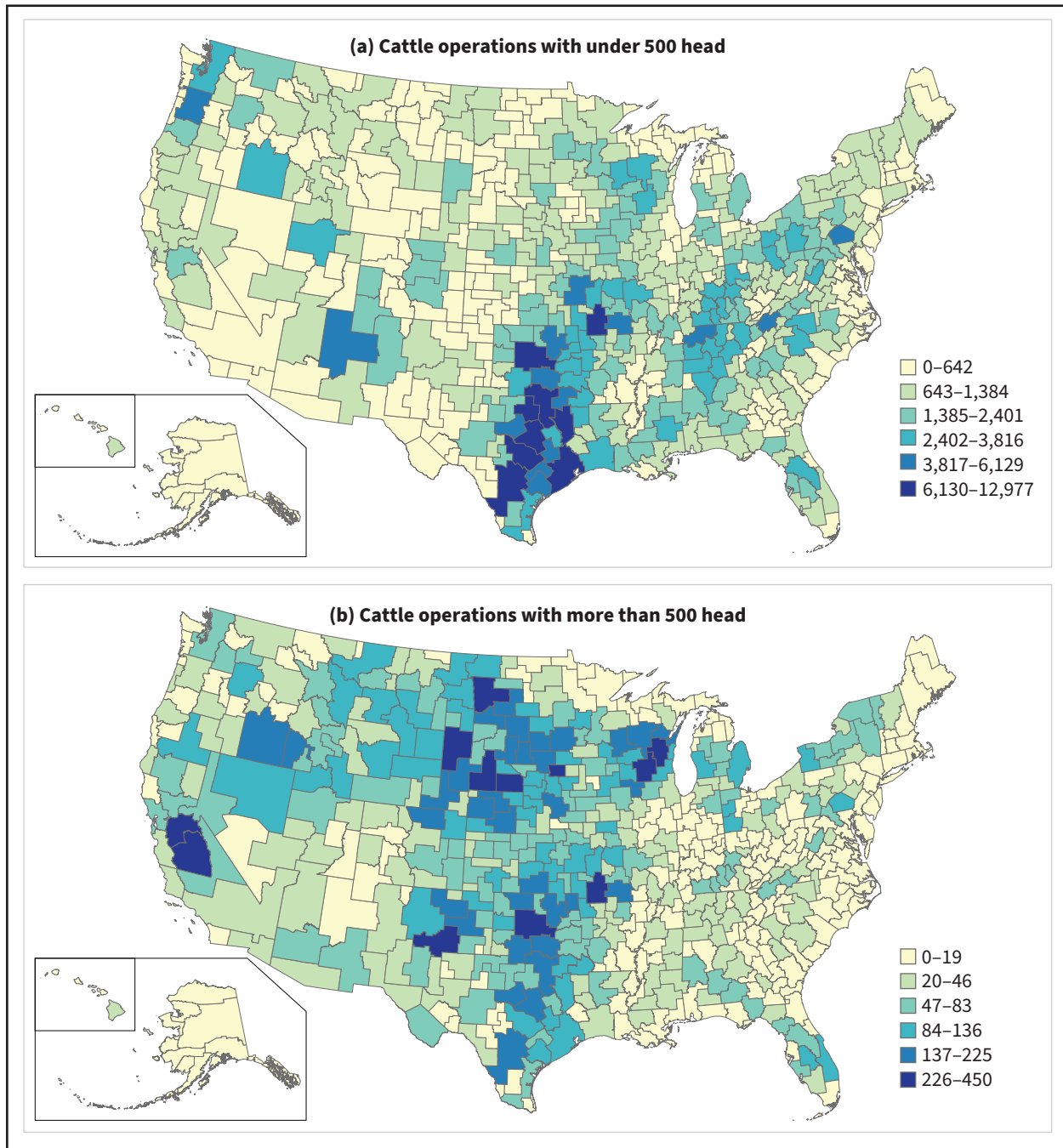
Based on the industry’s structure, this report focuses on cattle operations as drivers of demand for rural veterinary services. Although rural veterinarian shortages arise when the supply of veterinarians is insufficient to meet demand, there are various ways to observe and identify a shortage situation.

The following maps describe the geographic distribution of cattle operations by USDA, ERS commuting zones.¹¹ For operations with less than 500 head, the most concentrated areas are in the Southern Plains areas of Texas, Oklahoma, and Southern Missouri (figure 9, panel a). These are the top 3 States in cattle operations of all sizes; Texas alone is home to 18 percent of all cattle operations. Looking at the density of operations with more than 500 head of cattle (figure 9, panel b), Texas also has the most operations of this size, but there are more areas of concentration in certain Midwest and Northern Plains areas (Wisconsin, Nebraska, and the Dakotas).

¹¹ USDA, ERS commuting zones are geographic units of analysis intended to identify contiguous labor markets. The 2020 commuting zones group the 3,222 counties and county-equivalents into 598 distinct labor markets. A commuting zone is reasonably associated with a coverage area for a veterinary practice.

Figure 9

Total U.S. cattle operations by commuting zone, 2022



Source: USDA, Economic Research Service (ERS) using data from USDA, National Agricultural Statistics Service, 2022 Census of Agriculture and USDA, ERS 2020 Commuting Zone definitions.

Veterinarian Shortages

Shortage areas can be assessed geographically using cattle operation and veterinarian data.¹² Since the shortage of food-animal veterinarians is most pronounced in the cattle industry, a useful approach is to examine the ratio of cattle operations to bovine veterinarians. For example, smaller ratios could point to less severe shortages, while larger ratios highlight areas where the demand for bovine veterinarians is highest relative to the number of available bovine veterinarians in the commuting zone. To measure this, we divide the total number of cattle operations within a given commuting zone by the total number of AABP veterinarians in that same zone. On average, in commuting zones with cattle operations of under 500 head, there is 1 AABP veterinarian for every 76 cattle operations, with a standard deviation of 105. In contrast, for commuting zones with cattle operations of over 500 head, the average ratio is 1 AABP veterinarian to 14 cattle operations, with a standard deviation of 16.

Commuting zones are used in this analysis because veterinarians frequently travel considerable distances to service cattle, often crossing county lines, making county boundaries less relevant for capturing their true service areas. Commuting zones are constructed to be labor markets, with contiguous counties combined based on worker commuting patterns. Each commuting zone on average includes 5.3 counties. Half of commuting zones are completely rural, comprised of only nonmetro counties. Six percent of commuting zones include only metro counties, and the remaining 44 percent of commuting zones include a mix of metro and nonmetro counties. Neill et al. (2019) use a spatial-weight matrix estimation approach to define market areas for veterinarians. They find competition effects on veterinarian income from within the county, as well as from surrounding counties. This work motivates the choice of a larger commuting zone contiguous labor market geography over a more local county geography to proxy for a veterinarian practice area.

Figure 10 further breaks down cattle operations based on herd size, reflecting the changing landscape highlighted earlier: Small cattle operations have declined in number in the last 25 years, while larger operations have grown (MacDonald et al., 2018). This shift in market concentration means that cattle operations experience varying veterinarian demand depending on their size. To illustrate these differences, we categorize operations into 2 groups: those with fewer than 500 head and those with more than 500 head.

Figure 10, panel a reveals distinct regional patterns.¹³ Midwest States such as Kansas, Nebraska, Iowa, Ohio, Illinois, Indiana, South Dakota, and much of Michigan, Minnesota, and Wisconsin tend to have lower ratios, potentially suggesting areas where shortages are less severe. In contrast, higher ratios are found in Texas, Oklahoma, and the Mississippi Delta. In these regions, many commuting zones experience the most severe shortage, where cattle operations exist but no AABP veterinarians are present. The absence of AABP veterinarians does not necessarily mean the commuting zone has no veterinarians at all, however, since not all veterinarians who provide care for cattle are AABP members. In such areas, when veterinary care is needed, producers may have to reach out to veterinarians located far away or transport animals over considerable distances to receive care. Similar

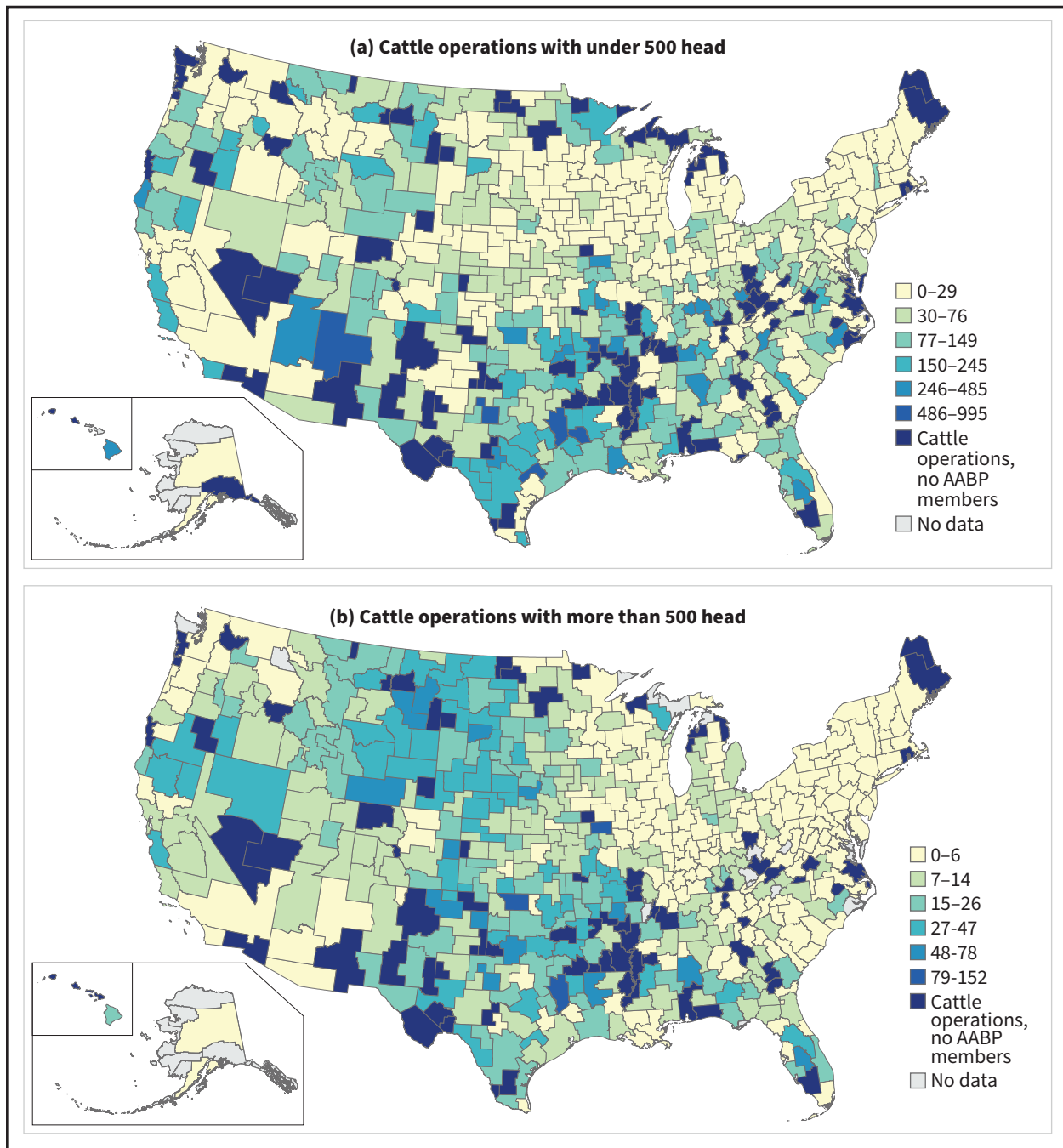
¹² Cattle operations include both beef and dairy operations. As such, ratios may distort differences in need between the two, though the precise amount is unclear.

¹³ Data regarding cattle operations are derived from the USDA's most recent Census of Agriculture, conducted in 2022. Since the census is performed every 5 years, this data do not fully correspond with the latest 2025 AABP membership figures. Consequently, the cattle operation statistics do not reflect herd contractions that occurred between 2022 and 2025.

commuting zones with cattle operations but no AABP members also appear in the Appalachian Valley and among border communities in Wisconsin, Minnesota, and Texas.

When examining the ratio for cattle operations with more than 500 head (figure 10, panel b), the results are generally consistent with those found for smaller operations. However, higher ratios emerge in the Pacific Northwest and Northern Plains (e.g., Montana, Idaho, North Dakota, and South Dakota), highlighting potentially increased veterinarian shortages in these areas. Since the majority of cattle operations are smaller, the ratios for operations of under 500 head are much larger than those for operations with more than 500 head, further pointing to the severity of the problem in regions dominated by smaller farms.

Figure 10
U.S. cattle operations Per AABP veterinarian, 2022/25



Note: American Association of Bovine Practitioners (AABP) veterinarians include those who self-reported their professional category of employment as private practice owner, private practice associate/employee, farm/ranch owner, farm/ranch employee/staff veterinarian, or not specified. Individuals who graduated more than 50 years ago are excluded from the analysis. Cattle operations are separated by the number of cattle at each operation.

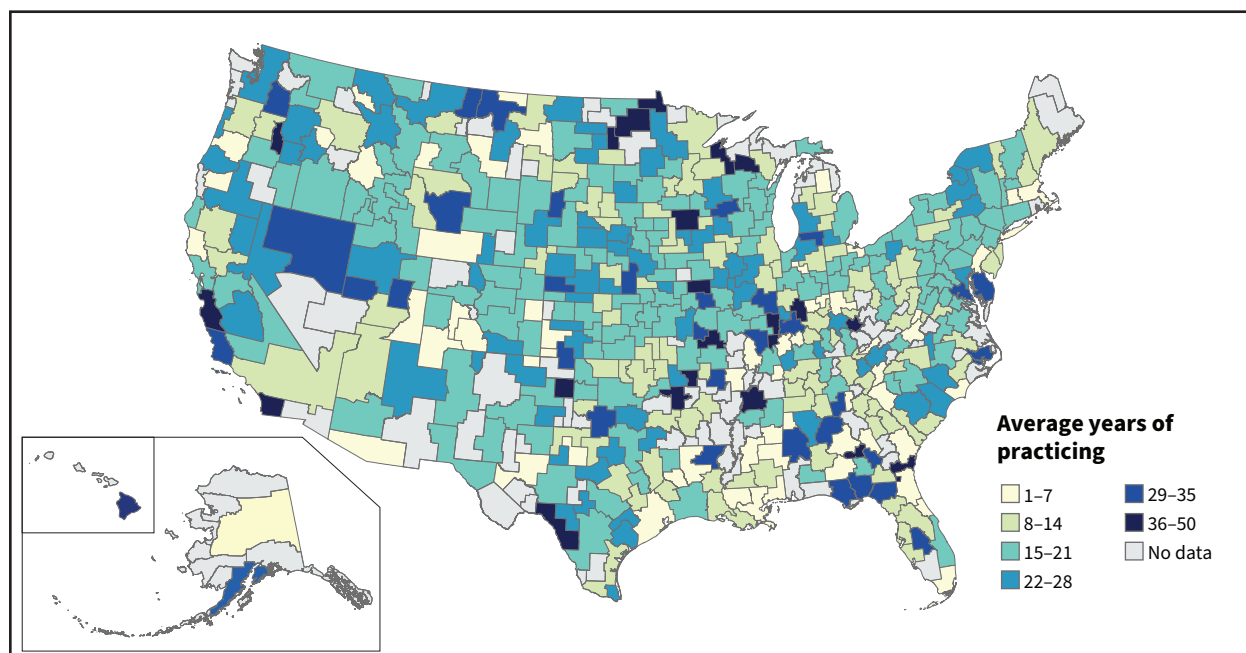
Source: USDA, Economic Research Service (ERS) using 2025 American Association of Bovine Practitioners membership data, the 2022 USDA Census of Agriculture, and USDA, ERS 2020 Commuting Zone definitions.

Veterinarian data can also be leveraged to predict where future shortages may arise, particularly as practitioners near retirement. By examining the number of years since veterinarians graduated from veterinary school, we can assess the average length of practice among active AABP veterinarians in each commuting zone. Figure 11 illustrates the geographic variation in these averages. Commuting zones with higher average years of practice indicate regions that depend on bovine veterinarians who are approaching retirement, signaling potential shortage areas in the near future. Importantly, a higher average number of years practiced is not only indicative of impending retirements but also reflects underlying workforce issues discussed earlier in this report, such as challenges related to education and compensation. Regions with an aging workforce often face difficulties recruiting and retaining new veterinarians due to limited access to educational opportunities, lower real incomes, and fewer amenities, all of which contribute to a lack of younger practitioners entering or remaining in rural practice. In contrast, zones with lower averages reflect a workforce composed of more recent graduates, suggesting that immediate shortages due to retirement are less likely and may indicate more favorable conditions for attracting and retaining new veterinarians.

Across the United States, average practice years in commuting zones range from 1 to 21 years in many areas. Some regions, however, especially southern Indiana, Illinois, Iowa, and Missouri, show averages from 35 to 50 years, highlighting the potential for imminent retirements and perhaps subsequent shortages. In addition to retirements, we acknowledge retention of practicing food animal veterinarians is likely an important contributor to rural shortages. Unfortunately, limitations of the available data for this report precluded an analysis of retention. By combining veterinarian demographic information such as year of practice with data on cattle operations per veterinarian, it becomes possible to identify both current and future gaps in bovine veterinary care.

Figure 11

Average years of experience among U.S. AABP veterinarians, 2025



Note: American Association of Bovine Practitioners (AABP) veterinarians include those who self-reported their professional category of employment as private practice owner, private practice associate/employee, farm/ranch owner, farm/ranch employee/staff veterinarian, or not specified. Practice years are determined by calculating the difference between 2026 and the individual graduation year. Individuals who graduated more than 50 years ago are excluded from the analysis.

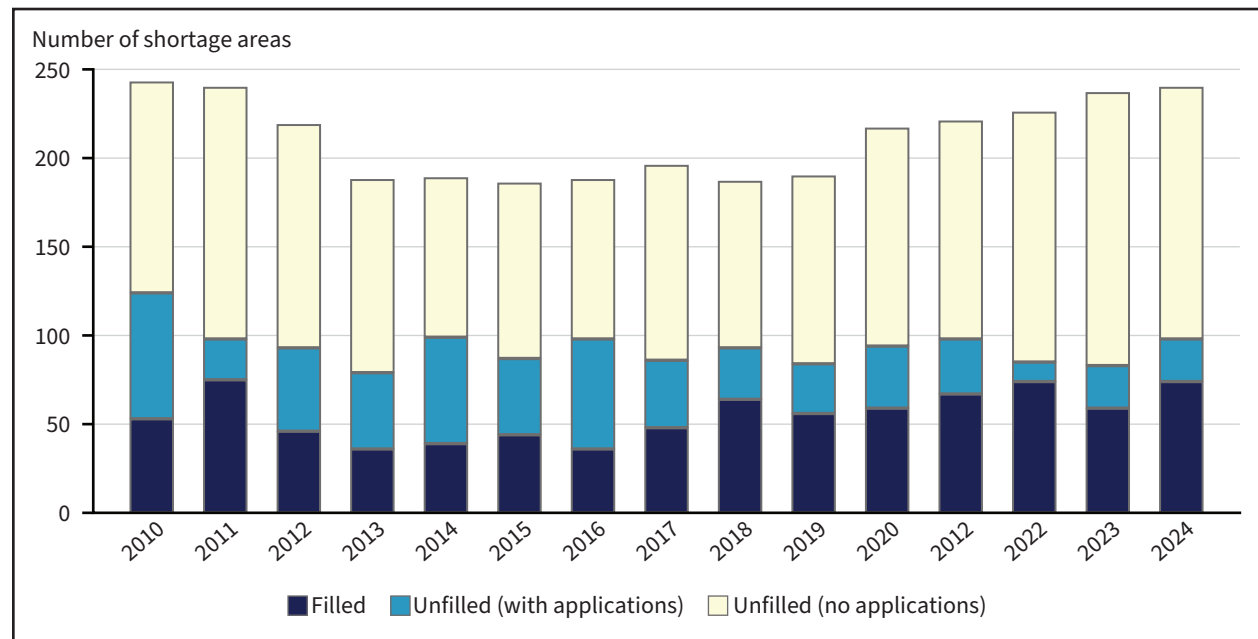
Source: USDA, Economic Research Service (ERS) using 2025 American Association of Bovine Practitioners membership data and USDA, ERS 2020 Commuting Zone definitions.

As introduced above, in 2010 USDA, NIFA introduced the Veterinary Medicine Loan Repayment Program (VMLRP) for veterinarians willing to work in shortage areas. Currently, veterinarians who commit to working in these shortage areas may receive up to \$40,000 for student loan repayment, per year, for a 3-year service agreement. The maximum amount of annual loan repayment increased to \$40,000 in 2026, up from \$25,000 per year. For the study period of this report from 2010 to 2025, loan repayment was up to \$25,000 per year. In addition, VMLRP reimburses the awardee up to 39 percent of the annual loan repayment to cover Federal tax obligations (VMLRP payments are considered income for tax purposes). Shortage designations are determined annually by State and Federal nominations. Most shortage areas are nominated by SAHOs subject to State allocations under VMLRP. Nominations are developed to be responsive to the program shortage situation area nomination guide (USDA, NIFA. 2024), and include a description of the unmet need, including supporting data “such as numbers of animals, farms/ranches, markets, etc.” (USDA, NIFA form 2009–0001, OMB No. 0524–0050). The nominations also reflect State allocation caps based on State land area and food animal sales, and the SAHO’s strategic judgement about where an award is likely to attract and retain an applicant. In the original design of the program, “to further ensure fairness and equitability, NIFA ensures that every State and insular area is eligible for at least one nomination and that all States receive an apportionment of nominations relative to their geographic size and size of agricultural animal industries” (USDA, NIFA, 2016).

Figure 12 shows 246 shortage areas were approved for the program in 2010. Fewer than 200 shortage areas were announced each year from 2013 to 2019, followed by an increase beginning in 2020 that culminated in 245 State shortage area designations by 2024.

Figure 12

Veterinary Medicine Loan Repayment Program (VMLRP) shortage areas by filled and unfilled status, 2010–24



Source: USDA, Economic Research Service using National Institute of Food and Agriculture (NIFA) Veterinary Medicine Loan Repayment Program (VMLRP) administrative data.

Each year, approximately 70 to 75 percent of shortage areas designated under the VMLRP program remain unfilled. However, this outcome reflects more than just the depth of veterinary shortages. The number of nominated shortage areas consistently exceeds the program's available funding, with appropriations typically supporting only a fraction of all shortage areas. As a result, some shortage areas remain unfilled due to budget constraints rather than a lack of willing veterinarians. An area categorized as "unfilled (with applications)" indicates that one or more applications were received but not selected or funded, which may be due to applicant pool quality, eligibility, or insufficient appropriations. For these areas there were no qualified applicants for that shortage, or a veterinarian did not accept a VMLRP offer and enter a service contract to serve the area. In contrast, "unfilled (no applications)" means no veterinarian applied to serve the area. For 2024, out of 240 announced shortage areas, 74 areas (31 percent) were filled, 24 areas (10 percent) received applications but were not filled (either not awarded or the applicant withdrew), and 142 areas (59 percent) received no applications. Over time, the applicant approval rate has risen, attributable primarily to an increase in annual Congressional appropriations from \$4 million in 2013 to \$10 million in 2023. By 2024, the number of shortage areas with applicants (both filled and unfilled with applicants) rose 24 percent from the lowest year in 2013, while the number of shortage areas awarded increased 61 percent. Notably, as funding for VMLRP has increased, the number of filled shortage areas has increased while the share of unfilled shortage areas with applications has decreased. Conversely, the number of shortage areas that received no applications also increased, though this may be indicative of the increase in total shortage areas designated.

We next explore the geographic distribution of VMLRP shortages. VMLRP designates three shortage situation types. Type I expects the awarded veterinarian to spend 80 percent of their time in private food-animal practice, and these shortage areas may be in rural or urban areas. Type II shortage nominations must focus on rural areas, and awardees must spend at least 30 percent of their time on food-animal practice. Finally, Type III nominations cover government public health, food safety, epidemiology, and diagnostic positions and are geographically designated for the location of the government facility. In 2026, 10 percent of shortage areas were Type I, 79 percent Type II, and 11 percent Type III. Type III shortage areas are excluded from the geographic analysis that follows because of our focus on private practices. Though Type I shortage nominations are not necessarily rural focused, in 2026 83 percent of them were nominated with a rural location center. Thus, the majority of Type I and II nominated shortage areas are either rural by requirement, or rural in practice.

Each nominated shortage area includes a collection of must-serve counties an awarded veterinarian is expected to cover. Figure 13 explores all counties included in shortage areas for 2010, the initial year of VMLRP, and the latest 2026 nomination year (USDA, NIFA, 2024).¹⁴ The figure is a geographic split of counties into nine types as defined by the USDA, ERS Rural-Urban Continuum Codes (RUCC).¹⁵ For each geography type, the chart shows the share of VMLRP designated shortage counties as a percent of all shortage counties. Rural areas are broken out by proximity to urban areas. Rural counties are further broken out by the size of the urbanized portion of the population (e.g., the micropolitan area core).¹⁶

¹⁴ The year change from 2024 in figure 11 to 2026 in figure 12 occurs because VMLRP applicant outcomes used to construct figure 11 are known only after all applications are processed and awarded.

¹⁵ For details, see the USDA, ERS Rural-Urban Continuum Codes documentation (USDA, ERS, 2025).

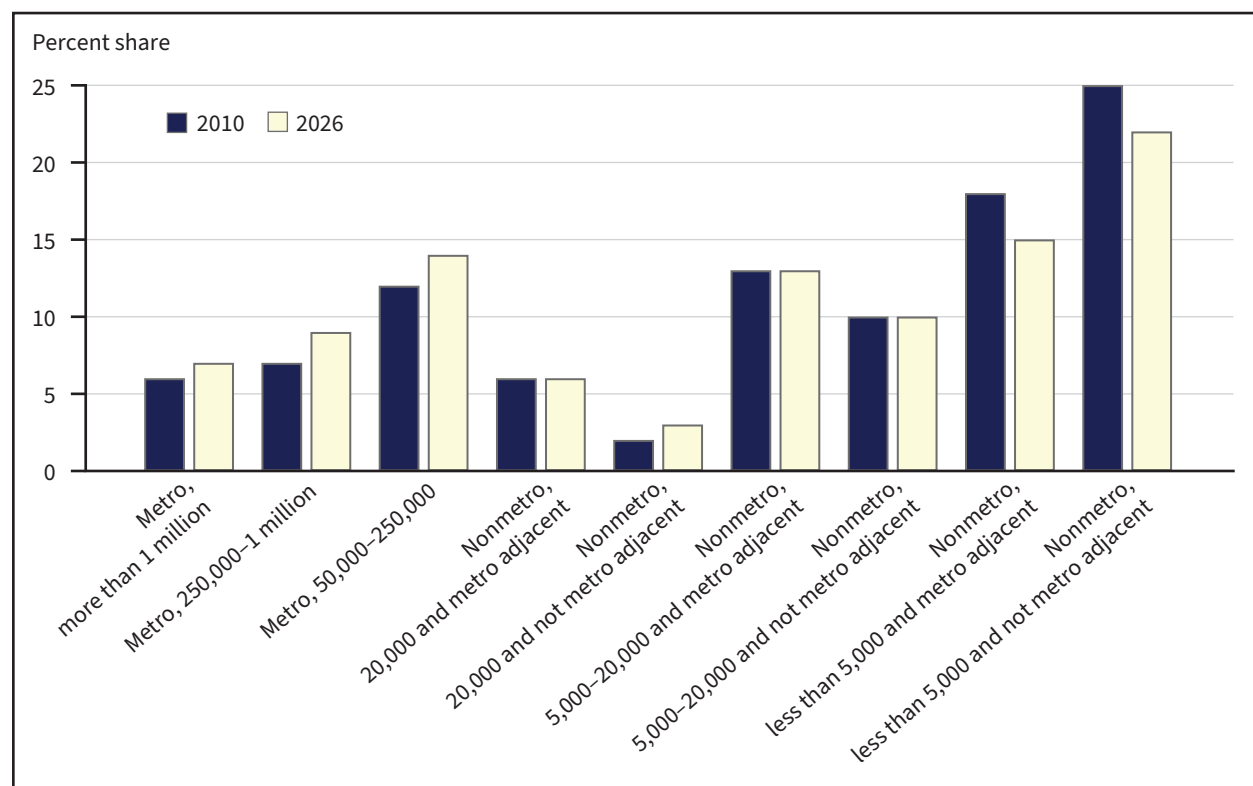
¹⁶ According to the U.S. Department of Commerce, Bureau of the Census' 2020 Standards for Delineating Core Based Statistical Areas (CBSA), each CBSA must contain at least 1 urban area with a population of 10,000 or more. Each micropolitan statistical area must have at least 1 urban area with a population of at least 10,000 but less than 50,000 (Census Bureau, 2026).

Several interesting patterns are apparent. Some counties that are part of large urban areas with more than 1 million inhabitants are included in shortage area nominations (e.g., 6 percent of VMLRP shortage counties in 2010 and 7 percent in 2026). Among urban areas, however, it is more common for VMLRP shortage areas to include counties that are part of a smaller metro area, specifically metro areas with an urban core population of greater than 50,000 and less than 250,000 inhabitants. Fourteen percent of shortage counties were in smaller metro areas in 2026. Most VMLRP shortage counties, however, were located in rural areas.¹⁷

In 2026, 10 percent of VMLRP shortage counties were in rural areas that are not near an urban area (not adjacent) with a micropolitan core population of more than 5,000 but less than 20,000, and 22 percent were in not adjacent rural areas with small micropolitan areas of less than 5,000 people. Of metro adjacent rural shortage counties, 13 percent were in counties with an urban core between 5,000 and 20,000 people, and 15 percent were in counties with urban cores of less than 5,000 people. In 2026, the two geography types with the highest shares of VMLRP shortage area were rural places with small urban centers. The selection of these kinds of counties by States for VMLRP shortage area nominations reflects the rural nature of veterinarian shortages. That smaller metro area cities with population cores between 50,000 and 250,000 were also well represented in the distribution of VMLRP shortage counties reflects that some urban shortages exist. In addition, it is possible SAHOs strategically seek some balance in nominating smaller cities to attract veterinarian applicants, where these cities are near areas with strong demand for food-animal veterinary services and are also communities with more people, amenities, and services more attractive for some veterinary professionals (Bir et al., 2026). Amarillo, Texas is a good example of these smaller cities that are centrally located in places that can serve the surrounding geographies of cattle producers.

¹⁷ Of the 3,144 U.S. counties in 2026, 1,958 (or two thirds) are rural.

Figure 13
Geographic distribution of Veterinary Medicine Loan Repayment Program (VMLRP) designated shortage counties, 2010 and 2026



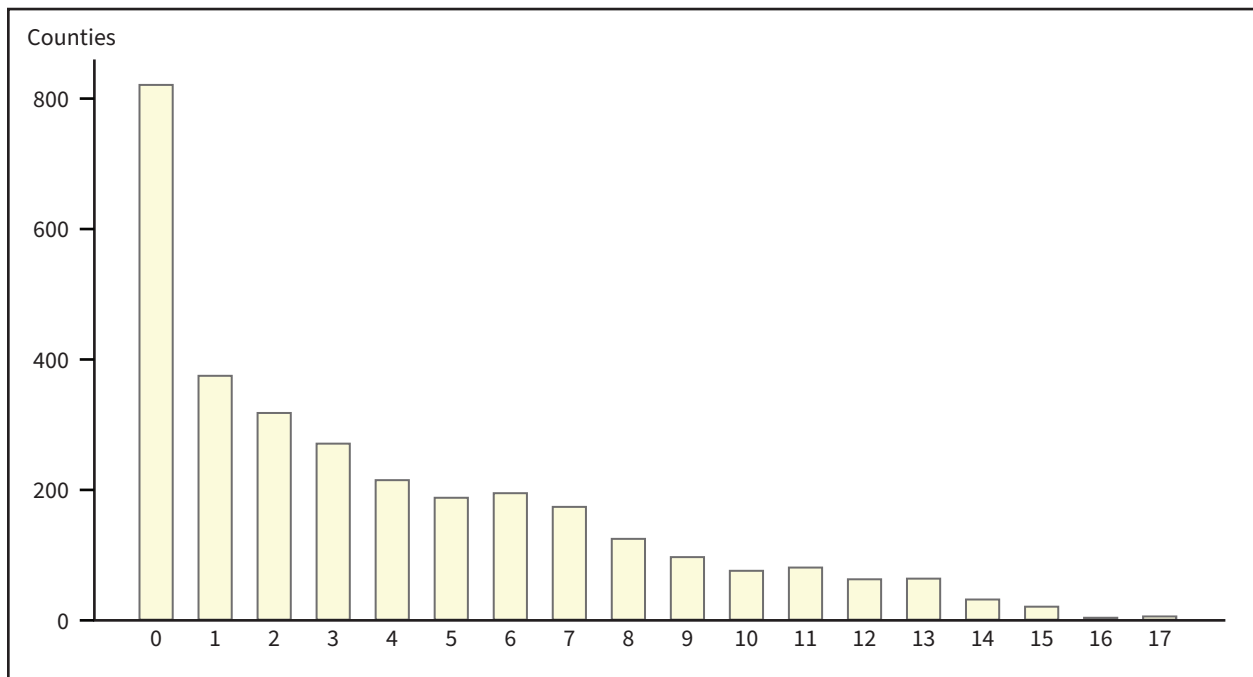
Note: The distribution shows the percent of veterinarian shortage counties by geographic classification as a share of all shortage designated counties. County geographic classification is as defined by the 2023 USDA, ERS Rural-Urban Continuum Codes (RUCC). Urban adjacent counties are rural counties that are not distant from an urban area. Not urban adjacent counties are rural counties that are more rural and distant from any urban hub.

Source: USDA, Economic Research Service (ERS) using USDA, National Institute of Food and Agriculture Veterinary Medicine Loan Repayment Program (VMLRP) administrative data and the 2023 USDA, ERS Rural-Urban Continuum Codes.

In summary, 70 percent of VMLRP shortage area counties were rural in 2026. Rural counties with small micropolitan cores account for the greatest number of shortage counties. Figure 13 highlights a tension underlying the VMLRP outcomes as documented in figure 12. Rural counties with small populations represent the preponderance of veterinary shortages, however, to attract veterinarians to these areas, SAHOs also nominate shortage areas that include both urban and rural counties.

Figure 14 reveals a greater extent of the veterinarian shortage crisis by showing the number of years in which counties have been nominated in a shortage area. About 26 percent of U.S. counties (822 counties) have never been included in a VMLRP shortage area nomination, implying that most counties have been designated in a shortage area at one point or another. Roughly 81 percent of rural counties and 62 percent of urban counties have been included in a VMLRP shortage area at least once between 2010 and 2026. Roughly 59 percent of U.S. counties (1,869) have been part of a shortage area between 1 and 8 times, less than half of the years the VMLRP program has existed. These include mostly intermittent and filled shortage counties. Another 453 counties (14 percent) are persistent shortage counties, nominated 9 or more times, which represent more than half of the years of the VMLRP program. These shortages are more structural and may require a more coordinated effort to mitigate them.

Figure 14
Count of U.S. counties by the number of times (years) each county was part of a Veterinary Medicine Loan Repayment Program (VMLRP) shortage area during 2010–26

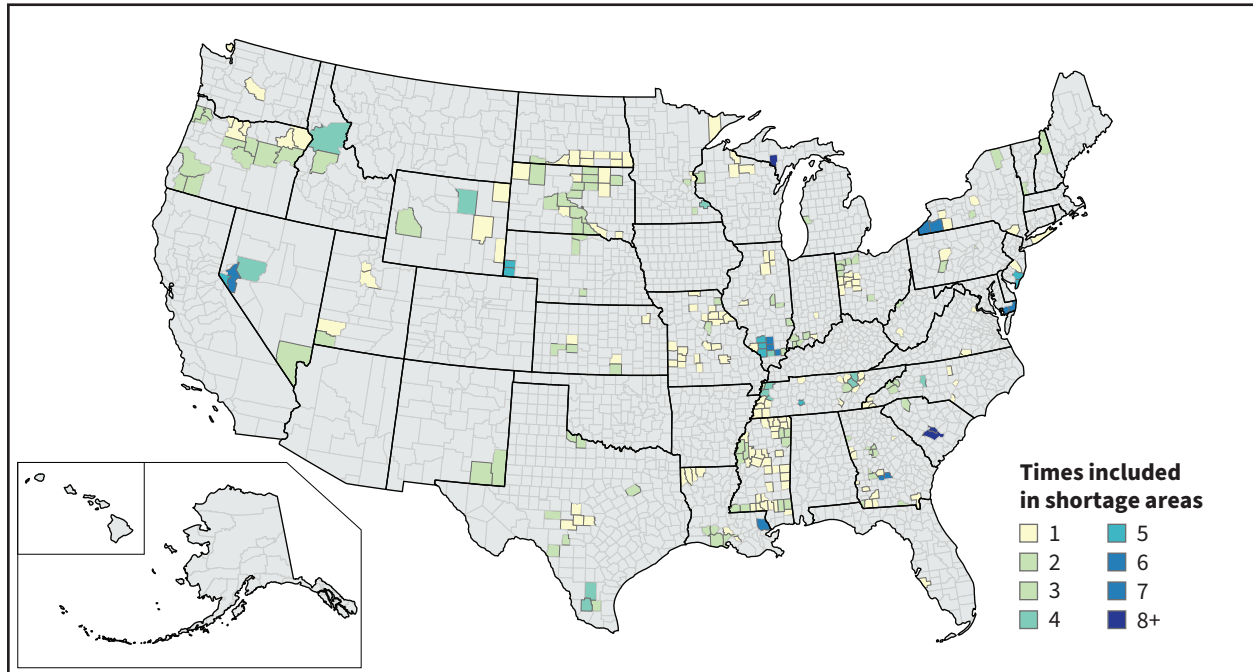


Source: USDA, Economic Research Service using USDA, National Institute of Food and Agriculture Veterinary Medicine Loan Repayment Program (VMLRP) administrative data.

The map of figure 15 shows those counties designated as a VMLRP shortage area that received no veterinarian applicants. The figure further color codes these counties based on how many times this has occurred. Pockets of these no-applicant counties are spread throughout the United States, with notable concentrations in Oregon, the Dakotas, Mississippi, Missouri, southern Illinois and Indiana, and western Ohio.

Figure 15

Counties with no Veterinary Medicine Loan Repayment Program (VMLRP) applicants, 2010–24



Source: USDA, Economic Research Service using USDA, National Institute of Food and Agriculture Veterinary Medicine Loan Repayment Program (VMLRP) administrative data.

The counties and areas nominated by the SAHOs for inclusion in VMLRP reflect the unmet needs in each State, but they may also reflect areas where the SAHO expects the position is most likely to receive applicants and be filled. From State to State, there can be variations in the criteria used and the strategic selection of shortage areas to nominate for the program. In the following section, we use data from the American Association of Bovine Practitioners (AABP) and the 2022 USDA Census of Agriculture to compare supply and demand of veterinary services for cattle on a more consistent basis across the United States.

The analysis of VMLRP shortage area nominations and county-level designations reveals a persistent and complex mismatch between where cattle operations are located and the availability of food-animal veterinarians. Although most shortage areas are found in rural counties, States frequently nominate larger micropolitan and smaller urban regions as shortage areas to attract applicants. This strategy often means that many remote and sparsely populated places continue to be underserved. Overall, these patterns highlight that coverage gaps are concentrated in areas with remote locations, small populations, dispersed agricultural activities, and an aging workforce.

Conclusion

In this study, we analyze multiple dimensions of the food-animal veterinary shortage, focusing on the mismatch between supply and demand, the influence of operation scale, and geographic disparities. First, a persistent mismatch exists between where food-animal veterinarians are available and where their services are most needed. Although rural applicants and students entering veterinary school represent a share similar to the rural U.S. population, this proportionality may not be sufficient to address the heightened demand for food-animal veterinarians in rural regions. While rural applicants tend to apply to fewer schools and receive fewer acceptances, their chance of being accepted to at least one program is comparable to urban applicants. Rural veterinary practices face declining (inflation-adjusted) annual revenues and have fewer veterinarians per practice, with lower average real annual incomes, making recruitment and retention increasingly difficult. This mismatch has not been fully solved by programs such as the Veterinary Medicine Loan Repayment Program (VMLRP), which may not fill designated shortage areas, leaving many rural counties underserved, and some counties consistently so.

Second, the scale of animal operations significantly impacts veterinary service needs and availability. Smaller cattle operations are widely distributed and require more individualized and seasonal veterinary attention compared to larger, vertically integrated poultry and swine industries. Smaller farms dominate regions with the most severe shortages. Larger operations, while growing in prevalence and requiring steady herd health management, are often concentrated in areas with relatively better access to veterinarians. The diversity and dispersion of beef cattle operations increase the demand for private practice veterinarians who can provide hands-on, specialized care, further highlighting the gap between veterinary supply and the needs of rural animal agriculture.

Third, geographic factors play a critical role in shaping the landscape of veterinary shortages. Rural counties are more likely to experience acute shortages, especially those counties with geographically dispersed cattle operations and an aging veterinary workforce. Regions such as southern Indiana, Illinois, Iowa, and Missouri exhibit high average years of practice among veterinarians, indicating a reliance on practitioners nearing retirement and signaling potential future shortages. States often nominate larger micropolitan and smaller urban areas for programs like VMLRP in an effort to attract applicants, but the most remote and sparsely populated regions remain underserved.

This analysis highlights the ongoing complexities within the food-animal veterinary landscape, shaped by supply and demand mismatches, operational scale, and geographic disparities. The interplay between rural practice characteristics, the distribution of cattle operations, and workforce demographics underscores the multifaceted nature of veterinary shortages. Continued observation of these factors is important for understanding future developments in rural veterinary services.

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