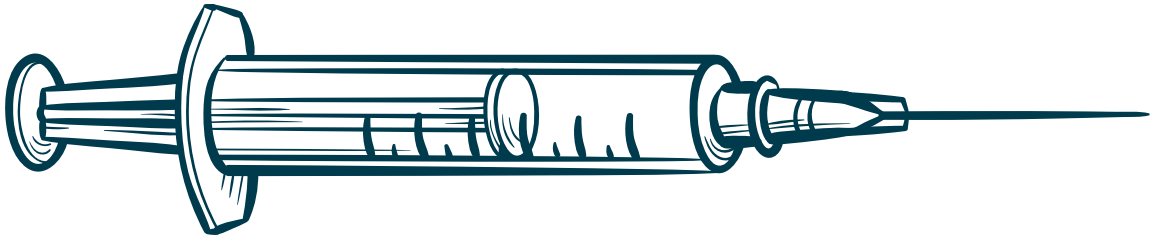
June 2023

THE LIVESTOCK VETERINARIAN SHORTAGE



IMPLICATIONS FOR FOOD SAFETY AND SECURITY

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EXECUTIVE SUMMARY

Veterinarians involved in food supply veterinary medicine, commonly referred to as "food animal veterinarians," play a crucial role in America's food supply chain. By caring for the health and welfare of livestock, they promote the consumption of animal-based products in a safe, sustainable, and ethical way. They also serve on the frontlines for infectious disease surveillance, including for emerging zoonotic diseases, and through this, contribute to national and global health security. In the face of a growing population and increased demand for animal proteins, the role of food animal veterinarians has never been more important to provide high-quality animal products through sustainable livestock systems.

Over the last several decades, the number of food animal veterinarians has decreased dramatically in the United States. This trend endangers public health by increasing our vulnerability to zoonoses, compromising food safety, and threatening food security. Poor preventive care and infection control in livestock also leads to the misuse and overuse of antibiotics. The problem is projected to worsen in the coming years, especially in rural communities.

Veterinarians and animal care workers share challenges and opportunities with both the agricultural workforce and healthcare workers—essential worker populations whose services are critical to the function of society. At the same time, the structure of employment and high job demands in this workforce can serve as barriers to access to healthcare and mental health services and detract from the essential functions they perform.

The Johns Hopkins Center for a Livable Future supports a robust food animal veterinary workforce to safeguard public health. A strong workforce is foundational for a resilient food system that is healthy, sustainable, and fair for people, animals, and the environment. This report aims to raise awareness about the shortage problem, so that policymakers will adopt the political and economic reforms to better support, recruit, and retain food animal veterinarians. Reforms include collaboration with state and local partners to measure the nature of the problem, encouraging a new emphasis on food animal medicine in the nation's veterinary schools, and a push for additional funding from Congress toward current recruitment and retainment programs. The primary audience for this report is government agencies, educational institutions, and community members involved in farm animal health and welfare, public health, and agriculture.

This report was developed collaboratively by researchers at the Johns Hopkins Center for a Livable Future and the Johns Hopkins P.O.E. Total Worker Health® Center in Mental Health (POE Center). Community members and veterinarians also provided

their insight on the drivers for supply and demand, and concerns regarding the shortage if it is left unfilled. We hope that this report serves as a resource to learn more about the topic and a starting point for discussions to create a more resilient and robust food animal veterinary workforce.

Since 1996 the Johns Hopkins Center for a Livable Future has been addressing some of the most pressing issues in the food system while advancing public health and protecting the environment. As an interdisciplinary academic center based within the Bloomberg School of Public Health and the Department of Environmental Health and Engineering, the Center for a Livable Future is a leader in public health research, education, policy and advocacy that is dedicated to building a healthier, more equitable and resilient food system.

The POE Center was founded in 2021 to promote worker mental health and well-being through research, education, outreach, and evaluation activities that integrate the psychosocial, organizational, and environmental (POE) domains of worker health. Total Worker Health® Centers in the National Institute of Occupational Safety and Health (NIOSH) complement traditional Education and Research Centers (ERCs) and Agricultural Centers through more holistic approaches that build on a foundation of occupational safety and health to use the workplace as a platform for delivery of services to promote health, mental health, and wellbeing.

BACKGROUND

A food animal veterinarian (FAV) is an animal doctor who provides medical care for "food animals," that is, animals that are raised to provide agricultural products, commonly referred to as livestock (AVMA, 2019). It takes seven to eight years of education to become an accredited FAV in the United States. This doesn't include additional degrees (e.g., MPH, PhD), internships, or residencies.

Where Do Food Animal Veterinarians Work?

Food animal veterinarians (FAVs) work in many places including private practice, industry, academia, and government. Private practice veterinarians may work exclusively with livestock or with a mix of different animal species. FAVs are also employed in industry, where many jobs are in pharmaceuticals and diagnostics. Outside of private practice and industry, FAVs may work as a federal veterinarian for government agencies such as the Food and Drug Administration, the Centers for Disease Control and Prevention, and the US Department of Agriculture, while others may pursue academic careers in education and research.

TABLE 1

Job Type	Examples
Private Practice	Food animal exclusive Mixed species
Industry	Pharmaceutical Diagnostics
Academia	Education Research
Government	FDA CDC USDA EPA

Why Do We Need Food Animal Veterinarians?

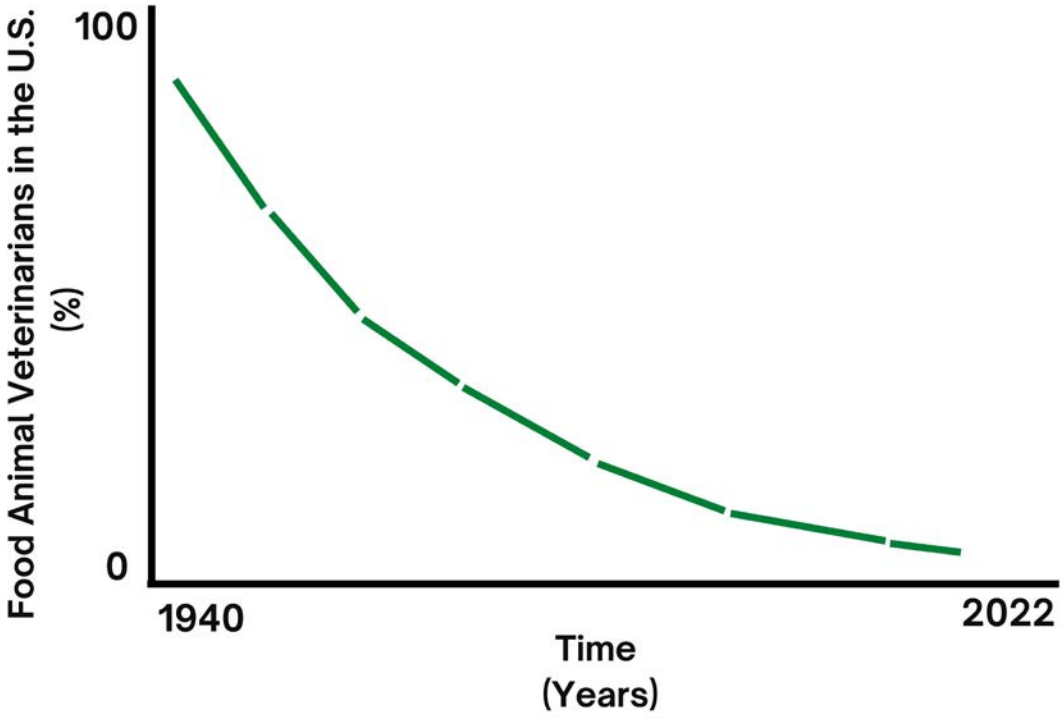
Food animal veterinarians (FAVs) are a valuable and integral part of society (NRC, 2015). They control food-borne diseases and ensure food safety by caring for animals on the farm. In addition to medical care and surgery, FAVs promote animal welfare through good animal husbandry. With professional training in infectious diseases, they prevent the spread of emerging and reemerging zoonotic outbreaks through regulatory work, surveillance, and educational programs. Their expertise in managing large disease outbreaks was also valuable during the COVID-19 pandemic. FAVs are critical in the "One Health" framework, a concept that recognizes the links between people, animals, plants, and the environment. One Health provides an interdisciplinary

mindset, allowing for FAVs to holistically solve problems by advocating for ecosystem health on land and under water.

The Problem: The Workforce is Shrinking

The number of food animal veterinarians (FAVs) has decreased by 90 percent since World War II, leaving less than 2 percent of veterinarians working exclusively with food animals today. In fact, a recent survey found that 728 counties in 50 states had potential FAV shortages (Tack, 2018). Despite the shortage of vets who can care for them, the number of animals being raised for food has increased drastically over the years (Barrington, 2010; NRC, 2015). This puts a disproportionate amount of strain on the remaining FAVs trying to do their job.

FIGURE 1. *The percentage of food animal veterinarians as a part of the total number of veterinarians in the United States over time.*



Quantifying this shortage has proven to be challenging (Wang, 2012). Unlike human medicine, where the doctor-to-patient ratio determines workforce shortages in each geographic region, veterinary medicine does not have a standard metric to determine the appropriate number of FAVs (Dicks, 2013; Prince, 2006; Tack, 2018). The shortage problem is also confounded by language, species variation, and changing production systems. Inconsistencies in terminology are a source of confusion when characterizing the need. FAVs can be referred to as “rural,” “large animal,” or “livestock” veterinarians, and this can lead to veterinarians inconsistently declaring their practice type on

membership database surveys (AVMA, 2021a; AVMA 2021b; CAST, 2020). Another challenge in addressing the shortage is that species differences are not reported. The size of the animal determines the number of animals a veterinarian can examine over a period. Lastly, the evolving production system makes it difficult for experts to meaningfully assess the workforce shortage. Agricultural practices have drastically changed so that higher livestock densities do not necessarily equate to higher needs.

TABLE 2. *Veterinary population by practice type (AVMA, 2021a).*

VETERINARY POPULATION BY PRACTICE TYPE	
Food animal	5.3%
Companion animal	69.7%
Mixed animal	3.2%
Equine	4.6%
Other private	0.3%
College or university	7.6%
State/local/federal gov't	3.2%
Uniformed services	0.7%
Industry	3.6%
Other public or corporate	1.9%

Current Efforts

The Veterinary Medicine Loan Repayment Program (VMLRP) provides insight into the current need for food animal veterinarians throughout the United States (NIFA, 2022). The Loan Repayment Program is a part of the National Institute of Food and Agriculture (NIFA) of the United States Department of Agriculture. It was established in 2003 to alleviate the financial burden facing American large animal veterinarians working in rural and underserved areas. The national grant repays up to $75,000 of educational debt ($25,000 annually) for veterinarians who commit to serving in a USDA-designated shortage area for three years. NIFA allocates states a given number of nominations based on livestock and livestock product total sales, and approximate land area. Chief State Animal Health Officials can submit the allocated number of veterinarian shortage situation nomination forms to NIFA to be considered for a spot on the list of VMLRP-eligible designations.

VMLRP Timeline

Veterinarian shortage situation nomination forms provide useful information on the geographic location, overall priority, and type of service needed. On page two of the form, State Animal Health Officials (SAHOs) have an opportunity to describe the importance and objectives of a veterinarian filling the position. They can also outline the specific veterinary activities needed in the shortage area, as well as past efforts to recruit and retain veterinarians. The nomination form provides space for SAHOs to highlight the risks of the veterinary position not being secured or retained.

FIGURE 2. *The VMLRP uses this nomination form to determine shortage situations.*

Shortage ID
VMLRP USE ONLY

NIFA **NIFA Veterinary Medicine Loan Repayment Program (VMLRP)**

National Institute of Food and Agriculture
US Department of Agriculture
Form NIFA 2009-0001
OMB Control No. 0524-0050
Expiration Date: 12/31/2022

Veterinarian Shortage Situation Nomination Form

To be submitted under the authority of the chief State or Insular Area Animal Health Official

Veterinary Medicine Loan Repayment Program (VMLRP)

This form must be used for Nomination of Veterinarian Shortage Situations to the Veterinary Medicine Loan Repayment Program (VMLRP), Authorized Under the National Veterinary Medical Service Act (NVMSA)

Note: Please submit one separate nomination form for each shortage situation. See the VMLRP Shortage Allocations section of the VMLRP web site (https://nifa.usda.gov/resource/vmlrp-shortage-allocations) for the number of nominations permitted for your state or insular area.

Location of Veterinary Shortage Area for this Nomination

Location of Veterinary Shortage: _____
(e.g., County, State/Insular Area; must be a logistically feasible veterinary practice service area)

Approximate Center of Shortage Area (or Location of Position if Type III): _____
(e.g., Address or Cross Street, Town/City, and Zip Code)

Overall Priority of Shortage:

Type of Veterinary Practice Area/Discipline/Specialty (select one) :

_____

For Type I or II Private Practice:

Must cover(check at least one)	**May cover**
❑ Beef Cattle	❑ Beef Cattle
❑ Dairy Cattle	❑ Dairy Cattle
❑ Swine	❑ Swine
❑ Poultry	❑ Poultry
❑ Small Ruminant	❑ Small Ruminant
❑ Other: _____	❑ Other: _____

For Type III Public Practice:

Employer: _____ Position Title: _____

Please select **one or more** specialty/disciplinary areas:

❑ Food Safety
❑ Public Health
❑ Epidemiology
❑ Other: _____

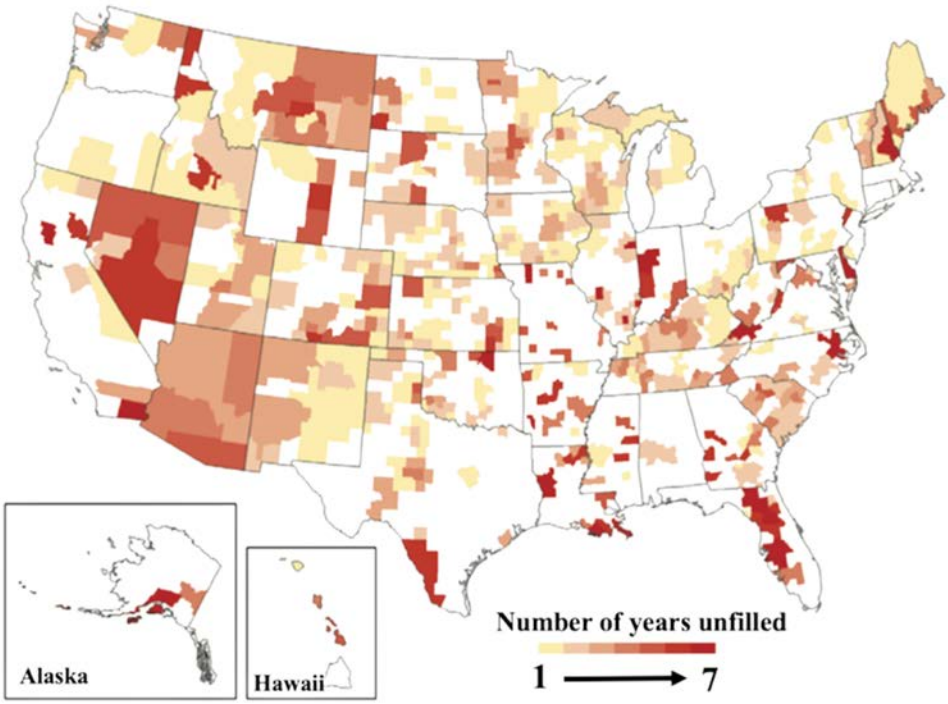
(Optional) If the nominator wishes to specify a service time for this shortage situation that is higher than the minimum required for the shortage type checked above, please specify the percent time in the box below (based on a 40-hour work week). Leave the box blank if the service time for this shortage situation is for the minimum percent time of the shortage type indicated.

☐ %

VMLRP Recruitment Issues

The Veterinary Medicine Loan Repayment Program (VMLRP) has had a positive impact on the veterinary profession; however, many shortage situations are left unfilled due to limited funding, lack of veterinary applicants, and the capped number of nomination forms in each state (Tack, 2018). The relatively low salaries for food animal veterinarians deter graduates from veterinary schools, who face an average of $200,000 in student debt (AVMA, 2021a; VIN, 2021). The $75,000 VMLRP grant covers less than half this amount. Another challenge is the limit to the number of nominations a State Animal Health Official (SAHO) may submit. VMLRP veterinary shortage nominations likely underrepresent the true need for food animal veterinarians in each state. In 2022, NIFA permitted only 12 states to submit seven or eight nominations, the highest two tiers of nominations allowed within VMLRP. SAHOs listed most of these nominations as "critical" or "high" priority. This suggests the program's funding does not meet demand. However, it is difficult to assess shortages in each state accurately due to state-level differences. SAHOs designate shortages according to their own definitions and priorities. Some may forget to submit the nomination forms altogether. Finally, there is no information on what career paths VMLRP non-recipients pursued after not receiving funding. The lack of financial assistance may have resulted in their employment in other areas of veterinary medicine.

FIGURE 3. *The number of years a VMLRP private sector shortage situation has been left unfilled by a veterinarian between 2010 and 2016 (Tack, 2018). This map only represents what was reported, and the findings are likely underreported.*



DRIVERS OF SUPPLY

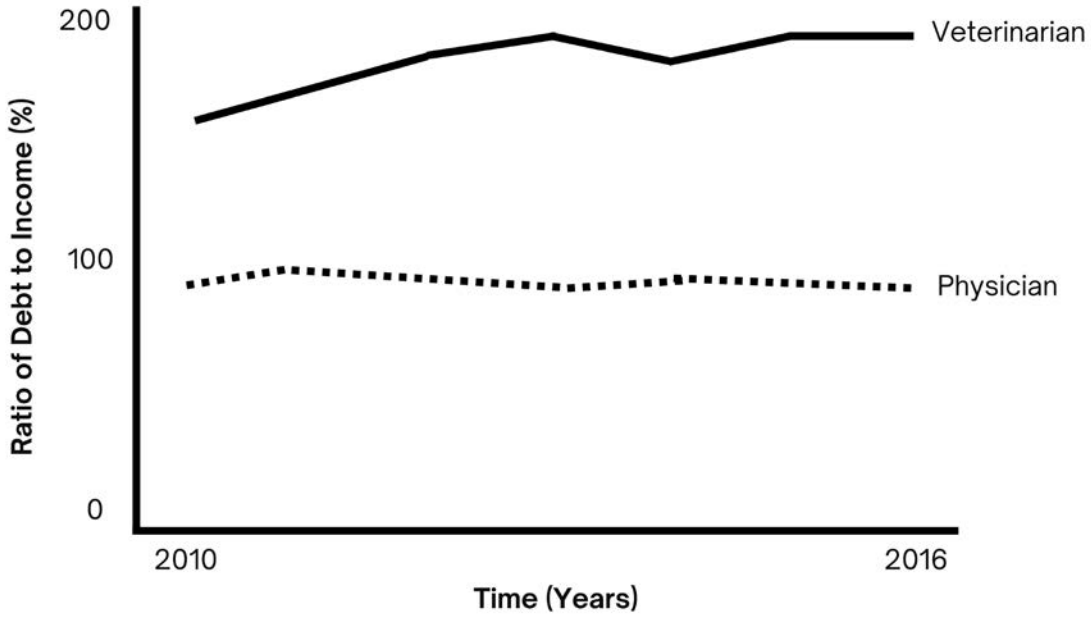
Educational Debt

Educational debt is often listed as the most significant reason veterinarians abandon working with food animals (Chieffo, 2008; Getz, 2012; Shepherd, 2009; VIN, 2021). With a six-figure student loan in hand, graduating veterinarians are attracted to companion animal clinics in urban areas that offer high sign-on bonuses, better compensation, and excellent job security (Banfield Pet Hospital, 2019).

> *"Many veterinarians still carry veterinary school-related loan debt and are enticed by urban corporations and other urban practices that seem to speak to that need to service that debt. Helping them meet that debt may help recruit them and keep them in rural communities to serve the agricultural community."*
>
> **—Central-Texas veterinarian and practice owner**

Graduating veterinarians acquire debt at twice the starting annual income, and a fifth of students have a debt-to-income ratio as high as 4:1 (AVMA, 2020). The time and costs of going through veterinary school are similar to those of medical school; both require four years of higher education, and the average student loan debt is approximately $200,000 (Bain, 2018; VIN, 2021). However, a veterinarian's mean starting salary for full-time employment is less than half of the starting salary range for a human physician.

FIGURE 4. *Ratios of debt to income for veterinarians and physicians between 2010 and 2016. Income data was collected from the American Community Survey. Student loan data was collected from surveys conducted through the Association of American Medical Colleges and Association of American Veterinary Medical Colleges (Chisholm-Burns, 2019).*



Building a practice in a rural community is financially impossible for many graduating veterinarians (Chieffo, 2008). Even if they want to, these veterinarians have significant graduate school debts, and cannot afford to stay in food animal practice (Andrus, 2006). Rural practices find it difficult to attract and retain veterinarians due to their high student loan debt. COVID-19 made things worse; the pandemic drove demand for veterinarians to work in small animal medicine, further limiting the pool of food animal veterinarians (Salois, 2021). For veterinarians who are successfully recruited, it is not uncommon for them to resign soon after to pursue jobs that offer better financial compensation. Multiple SAHOs are concerned that practices will close due to the continued failure to hire and retain practitioners.

Federal programs such as the Veterinary Medicine Loan Repayment Program may pay for a portion of student loans, but the level of repayment may not be enough. Several State Animal Health Officials also expressed concerns that funding through the Veterinary Services Grant Program is insufficient to meet the need for year-round engagement by a veterinarian.

Aging Workforce

The aging of the population contributes to the shortage. Retiring food animal veterinarians are trying to find a replacement before leaving the profession. However, replacements are difficult to secure given the lack of graduating veterinarians interested in food animals (NRC, 2013). Some states have searched for several years with little luck. Unable to fill this gap, State Animal Health Officials expressed that many large animal private clinics have shut down. The remaining clinics, many of which are also understaffed, are now seeing unsustainable surges in clients and patients.

> *"This shortage situation has been previously nominated but not filled. The veterinarian in this shortage situation, who continues to work well into retirement age, is concerned about leaving without a veterinarian and has publicly offered to give away his practice clinic, equipment, furniture, and his pickup. Local businesses rallied and provided funding for a veterinary student summer intern who has expressed interest in taking over the practice upon graduation."*
>
> **—Courtney Wheeler DMV, Senior Veterinarian, Minnesota Board of Animal Health**

> *"In Nez Perce county, the only mixed clinic has lost 2 vets to retirement in the last 10 years and has been unable to replace them despite having a fully equipped facility with calving stalls, alley ways, hydraulic squeeze chutes and a full horse barn. The saleyard in Nez Perce county has had to bring a veterinarian out of retirement to service the market on sale days to meet regulatory requirements for marketed livestock. There is a tremendous need for emergency work with dystocias, prolapses etc…but, the existing practices cannot meet the demand. Vets in the area all agree the current workload is unsustainable."*
>
> **—Scott R. Leibsle DVM, DABVP (Eq), State Veterinarian/ Administrator - Animal Industries, Idaho State Department of Agriculture**

A difference in generational work cultures can also affect the retention of new graduates. Younger veterinarians may prioritize work-life balance and be reluctant to take on-call shifts or work more than 40 hours a week. Older veterinarians accustomed to working overtime may perceive a younger veterinarian as having a poor work ethic (CAST, 2020). This generational discrepancy in the definition of "success" can strain the work environment, and younger veterinarians may elect to leave the practice if they do not feel appreciated and supported (Zemke, 2000).

Gender

Gender may play a role (Kinnison, 2013). Food animal medicine has traditionally been a male-dominated profession, but the number of men enrolling in veterinary schools has decreased by 80 percent since the 1970s (AVMA, 2021a). This has caused a disproportionate decrease in the number of food animal veterinarians (FAVs) available.

A female veterinarian may feel intimidated by gender-biased farmers who may not accept a "girl vet" or refuse to provide fair compensation (NRC, 2013). Shaping large animal medicine to make women feel accepted, respected, and supported is an important factor in recruiting and retaining female veterinarians who will comprise most of the FAV workforce in the future.

FIGURE 5. *Year of graduation by gender between 1960 and 2019 based on data collected through AVMA's 2020 Census of Veterinarians. This image was adapted from the AVMA Report on Economic State of the Veterinary Profession (AMVA, 2021a).*

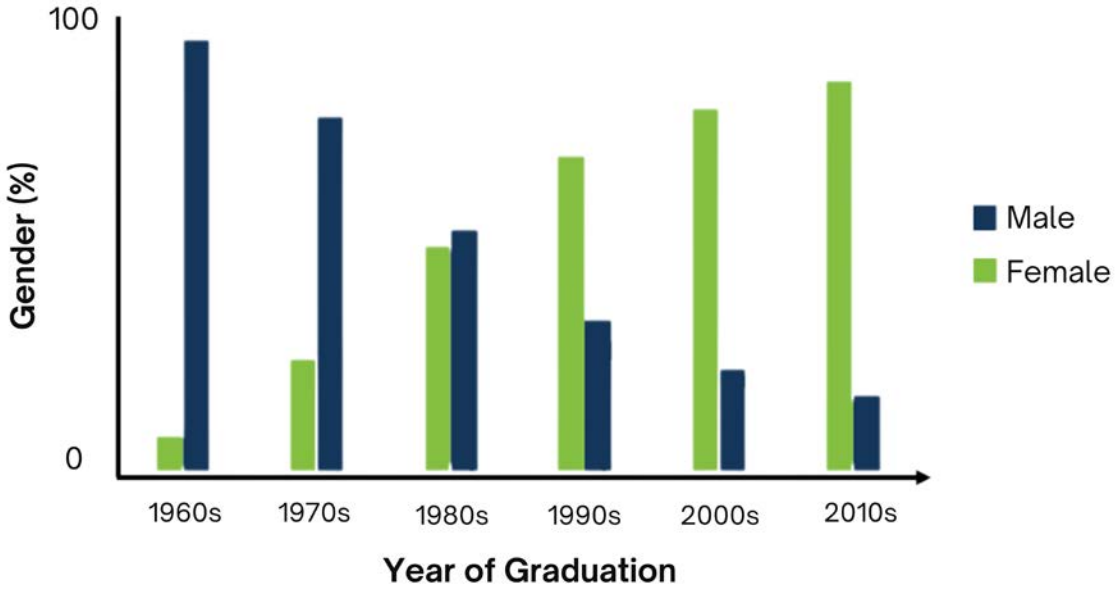
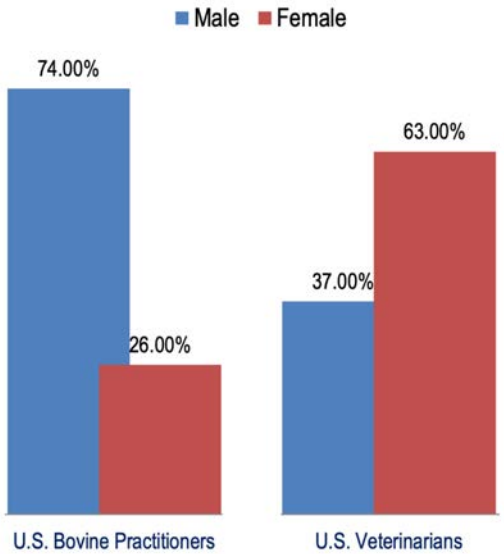


FIGURE 6. *Male veterinarians still make up a large portion of bovine practitioners, especially when compared to the overall number of U.S veterinarians by gender. The male practitioners are older and getting ready to retire. This image is from data collected through the AVMA and the American Association of Bovine Practitioners (AVMA, 2016).*



Lack of Diversity

The veterinary profession is lacking diversity. In fact, white Americans are the ethnic and racial majority of the workforce. The 2021 Bureau of Labor Statistics reports that 93.3 percent of veterinarians are white, 5.6 percent are Asian, 4.7 percent are Hispanic or Latino, and only 1.2 percent are black or African American (BLS, 2021). Less is known about other kinds of diversity, such as gender identity and sexual orientation.

Diversity brings creativity and innovation. Without a more concerted effort to promote diversity, equity, and inclusion, the profession will continue to attract like-minded individuals, ask the same questions, and develop solutions based on making biased assumptions. With high academic costs and opportunities that favor homogeneity, students from minority groups will have less equitable access to entering the veterinary profession.

> *"I was one of the few openly gay students in my veterinary class, and while many fellow students were accepting, I also experienced bullying. When I started practice as a mixed-animal veterinarian, I was told by my first boss that I should not disclose this to the clients. I understood his reasoning, and I complied, but not being able to be who I was at work, which (given that I worked 70-90 hours a week) was most of my life, factored into my decision to leave rural dairy/mixed practice for a progressive, multi-doctor suburban small animal practice."*
>
> **—Former Food Animal Veterinarian**

Lack of Familiarity with Livestock

Recruiting and retaining recent graduates in rural areas may also be difficult due to their lack of familiarity with large animals (CAST, 2020; Elmore, 2003). Veterinary schools today primarily focus on companion animal medicine rather than food animal medicine. With limited budgets and extramural funding to support ongoing programs and facility needs, veterinary schools are inclined to invest in small animal veterinary medical teaching hospitals that generate higher revenue (Villarroel, 2010). As a result, schools fall short of providing students with adequate exposure to large animals (Posey, 2012).

This lack of exposure is a problem because most veterinary applicants come from urban backgrounds with little exposure to farm animals. If students lack exposure to large animals during veterinary school, they are less likely to pursue a career in food animal medicine (Lenarduzzi, 2009). Furthermore, there is a lack of awareness about career opportunities available for students that pursue food animal medicine.

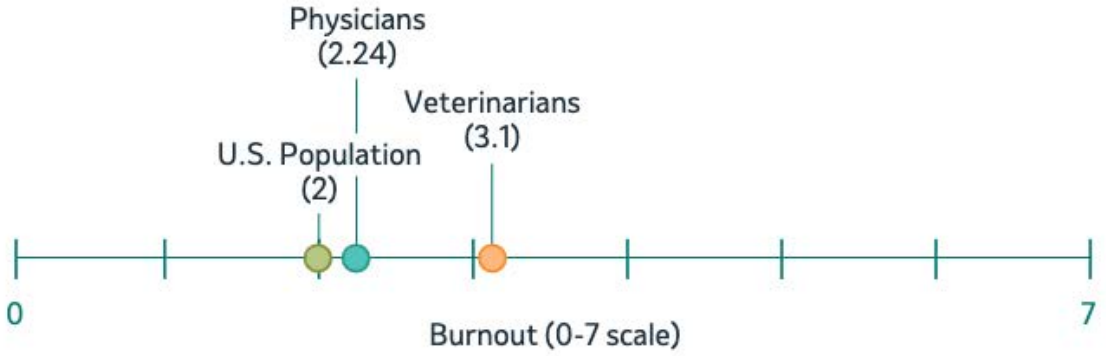
"It is difficult to hire veterinarians in rural practice when they can earn more in an urban setting and work a more established hourly schedule. One clinic in the area lost an associate to an urban clinic and is attempting to hire. Another clinic in the area is for sale as the practitioner wishes to retire. A third clinic has been able to hire new associates, but there are concerns about retention. As practitioners continue to retire or leave the area this puts pressure on the remaining practitioners and new associates."

—Justin Smith DVM, State Veterinarian for Kansas

Mental Health

Compassion fatigue and burnout are serious concerns for veterinarians; 66 percent feel overworked, 38 percent desire to leave the profession, and only 30 percent would recommend a career in veterinary medicine (AVMA, 2021a). A recent study showed that female veterinarians are 3.5 times and male veterinarians were 2.1 times more likely to commit suicide compared to the general American population (Tomasi, 2018). In fact, one in every six veterinarians has contemplated suicide since leaving veterinary school (Nett, 2015). While further studies should specifically examine how mental health affects food animal veterinarians (FAVs), lower salaries and high workloads compared to their small-animal counterparts may put additional strain on FAVs (Brscic, 2021; Ouedraogo, 2021). The rural lifestyle can also feel isolating. Veterinarians from urban backgrounds may have difficulty adjusting to the rural environment, especially if there is limited availability and access to mental health resources (Tyler, 2006). Without healthy coping strategies, recent graduates in rural practices may quickly become overwhelmed and seek employment elsewhere.

FIGURE 7. *Burnout scale (0 - 7) for veterinarians, physicians, and the overall U.S. population (Merck Animal Health, 2021).*



DRIVERS OF DEMAND

Veterinarian-Client-Patient Relationship

Under the Veterinarian-Client-Patient Relationship (VCPR), veterinarians must engage with the animal producer, make clinical judgements about the patient (the animal) based on physical examinations, and conduct follow-up care in a timely fashion (AVMA, 2022b; Senate Bill No. 27). With one veterinarian for every 85,000 head of cattle in some states, it is physically impossible for the current veterinary workforce to adequately meet VCPR requirements.

Antibiotic Stewardship

The Veterinary Feed Directive (VFD) has increased the demand for veterinarians because producers now require more veterinary oversight to care for their livestock (FDA, 2022). Prior to implementation of the VFD, producers had access to over-the-counter antibiotics to feed their animals. Implemented in 2017, the VFD requires producers to obtain veterinary oversight for all therapeutic antibiotics used on the farm.

With this changing regulatory landscape, there is a renewed interest in preventive care and good animal husbandry to reduce the need for medications (Gozdzielewska, 2020; Okafor, 2022). And food animal veterinarians (FAVs) are the linchpin to guide producers in areas of preventive care. They curb the routine therapeutic and preventive use of antibiotics by improving animal husbandry practices, maximizing vaccination protocols, and formulating better diets (Rodrigues da Costa, 2022; Sarrazin, 2019; Webster, 2001). The Five Freedoms—created by Britain's Farm Animal Welfare Council in 1965—outlines animal welfare under human control and has been recognized and adopted globally by FAVs to increase productivity and decrease morbidity in livestock (Terrestrial Animal Health Code, 2011).

Regulatory efforts to combat antibiotic resistance vary by state. Some states have enacted laws that are stricter compared to others. For example, California's Senate Bill No. 27 (Antimicrobial Use and Stewardship Services Law), authored by Sen. Jerry Hill (D-San Mateo), was a big step in reducing antibiotic use in California (Senate Bill No. 27). This bill brought to surface the desperate need for FAVs to meet the antibiotic stewardship principles outlined in the law (Wison-Combs, 2018; Senate Bill No. 27).

Federal and state initiatives to combat antibiotic resistance is a step in the right direction. However, a strong FAV workforce is needed to implement, practice, and carry out those policies.

"[I'm concerned about SB27 because] animals will suffer. Animals will suffer because they probably won't see any treatment. Relationships beyond the VCPR may be increasing and may be exploited."

—Food Animal Veterinarian

Backyard and Hobby Animals

Backyard and hobby animals, including small flocks and goat dairies, are increasing all over the United States (Brinkley, 2019). Unfortunately, they have a hard time getting veterinary care (Pires, 2020). A recent survey found that 82 percent of backyard and small-scale livestock and poultry owners are seeking information about animal health from the internet (Pires, 2019).

One State Animal Health Official shared that the veterinarians serving an area usually manage the biggest clients first, leaving backyard or smaller producers struggling to get timely medical care. Also, the companion animal veterinarians available in the area may not have experience handling food animals or dealing with food safety regulations.

"[An exotic] veterinarian took care of [my] guard goose—Honk—who had to be euthanized two weeks ago because of an impacted colon that could not be managed (surgery failed)."

—Backyard Hobby Farmer

Hobby farmers also expressed the lack of animal health inspections. One hobby farmer summarized that learning about production/management practices, animal health, and animal welfare happened through "trial and error and increased self-education."

"Never had an inspector actually come onto the farm (although they could). Farming community is tight and there would likely be a flurry of calls around the community if an inspector did show up."

—Backyard Hobby Farmer

"These historically more remote areas of the state have experienced rapid population growth recently with many new residents wanting to hobby farm and there are simply no vets available to provide them the care they need."

— Scott R. Leibsle DVM, DABVP (Eq), State Veterinarian/ Administrator - Animal Industries, Idaho State Department of Agriculture

"Veterinarians serving the area often manage the biggest clients first, and many backyard or smaller producers find it challenging to get timely veterinary care for their animals. The result can be a deleterious effect on livestock health due to delays in treatment and can lead to the potential for the development of disease reservoirs developing in smaller hobby farmers that do not routinely practice appropriate biosecurity protocols and who may not be adequately trained to recognize foreign animal diseases."

—Local stakeholder in shortage area, Quote refined by California Department of Food and Agriculture, Reviewed and approved by Annette Jones DVM, State Veterinarian for California

Animal Welfare

A growing number of consumers are demanding organic, ethical, and sustainably produced animal-source food products (de Boer, 2022; Walker, 2009). The implementation of health management and treatment is an important component of organic animal production and high animal welfare standards. As public concerns for animal welfare grow, veterinarians play an important role in meeting this demand by advocating for animal health through education, training, and consultation. More food animal veterinarians are needed to meet this societal demand.

CONSEQUENCES

Infectious Disease

The shortage of veterinarians comfortable and capable of working with food animals makes us vulnerable to future pandemics (Ferri, 2021). Veterinarians detect and prevent emerging and foreign animal diseases. Therefore, the lack of veterinary care increases the risk for infectious diseases and poor herd management, which can have a negative impact on the local economy and community (Prince, 2006).

The Centers for Disease Control and Prevention estimates that two-thirds of emerging and reemerging infectious diseases are zoonotic in origin, and most of these infections are associated with animals raised for food production (CDC, 2021; Morens, 2020). Most outbreaks occur as a direct result of poor farm hygiene, compromised animal welfare, and poorly regulated market systems (Milbank, 2022). This compromises farm animal health, threatens the food supply chain, and gives rise to zoonoses (CDC, 2021; Wu, 2017). COVID-19 is a zoonotic disease and a reminder of the need for better food animal surveillance systems (Beirne, 2020; Morens, 2020).

Antibiotic Resistance

The Veterinary Feed Directive requires producers to consult with a veterinarian to ensure appropriate and judicious use of antibiotics (FDA, 2022). However, not all producers can establish this Veterinary-Client-Patient Relationship if there are not enough veterinarians available (AVMA, 2022b; Senate Bill No. 27). As a result, producers may seek medical treatment without the guidance of a veterinarian; they may self-diagnose, illegally obtain antibiotics, and administer medications on their own. Therefore, the shortage of food animal veterinarians may lead to the adulteration of antibiotics.

The lack of veterinarians will lead to:

- compromised monitoring of herd health
- lack of data and record-keeping
- insufficient knowledge of how antibiotics are being used on farms (Shannon, 2015)

> *"With the Veterinary Feed Directive, we need practitioners to consult with producers to make sure that antibiotics are used properly to help prevent antibiotic resistance. Without food animal practitioners embedded in the area, the producers will self-diagnose their livestock's ailments and be more apt to illegally acquire and use drugs improperly."*
>
> **—Rod Hall DVM, State Veterinarian for Oklahoma**

"Failure to have available veterinarians increases the misuse of illegally obtained pharmaceuticals and subsequent contamination of the food supply. We also have seen an increase in clients trying to diagnose, treat, and perform procedures on their animals due to the lack of available veterinarians in the area which contributes to an increase in animal suffering, disruption of the food supply, and more cost to the producer in the long run."

—Community member in Texas

Compromised Welfare

The shortage of food animal veterinarians reduces the quality of care provided to each animal, compromising farm animal welfare. In emergency situations, the only option for many producers is to transport their animals to the closest university hospital. Without veterinary guidance, producers are forced to make difficult decisions on their own. And these decisions, whether intentional or unintended, may harm an animal. A livestock stakeholder from Texas describes how many producers that "cannot obtain veterinary advice in a timely manner" are forced into "do it yourself" situations. If finances and resources are limited, many will euthanize.

"Livestock clients find it difficult to obtain timely responses to appointment requests and emergency calls, due to the sole practitioner's heavy caseload. The current veterinarian is planning to retire soon, which would leave the practice area with no veterinary services. Transporting livestock over long distances to alternate care providers for urgent medical conditions is challenging and can result in unnecessary animal suffering due to treatment delays."

—Local stakeholders in shortage areas, Quote refined by California Department of Food and Agriculture, Reviewed and approved by Annette Jones DVM, State Veterinarian for California

Economic Loss

Animal agriculture is the primary industry for many states with shortages in food animal veterinarians (FAVs). And veterinarians are the cornerstone for local producers who rely heavily on agriculture and livestock production. If food animal producers do not have access to a veterinarian, infectious disease surveillance worsens, productivity decreases, and the business prospects of the producers suffer. Therefore, the shortage of FAVs has a negative impact on the economies of communities that depend on animal agriculture.

Due to the lack of veterinary support, State Animal Health Officials describe how some producers may relocate to a new area or disperse their herds. This would affect the viability of the local producers and the local community.

> *"If the veterinarian to food animal ratio is not increased, producers will have to travel further to market their livestock and obtain veterinary services, thus increasing their cost of production resulting in a decreased net income. The loss of income to livestock producers would have a negative impact on the economy of the region resulting in a reduction of funds available for local schools, community projects and services. As agriculture is the primary industry in Missouri, a more sustainable veterinary practice serves as a cornerstone for the viability of the local producers."*
>
> **—Steve Strubberg DVM, State Veterinarian for Missouri**

> *"The availability of food animal veterinarians has almost disappeared in our area…To say there is a need in this particular area is an understatement. The producers deserve to have access to affordable and reliable veterinary care to better help them produce safe and affordable food products and maintain their livelihoods."*
>
> **—Angela Lackie DVM, Assistant Executive Director of Animal Health Programs and liaison for the VMLRP, Texas Animal Health Commission, Reviewed and approved by Andy Schwartz DVM, State Veterinarian for Texas**

DISTILLING THE PROBLEMS

Problem 1 - Poor Tracking: There is a shortage of food animal veterinarians, but the degree and extent of the need is unclear. Veterinary Medicine Loan Repayment Program directed efforts are appropriate but not sufficient to monitor progress.

Problem 2 - An Uneven Playing Field: Graduating veterinarians are not interested in working with food animals due to a lack of familiarity, educational debt, and other barriers. As a result, many enter small animal practice.

Problem 3 - A Fragile System: The current system makes it difficult for food animal households (i.e., producers, hobby owners) to adequately care for their livestock.

RECOMMENDATIONS

Better Tracking

Collect More Information

- **Improve Record-Keeping and Data Collection:** The United States Department of Agriculture should develop a comprehensive data collection plan. The National Institute of Food and Agriculture should work in collaboration with the Animal and Plant Health Inspection Service and the National Animal Health Monitoring System to lead this effort.
- **Collect Information on All Veterinary Medicine Loan Repayment Program Applicants:** If they were not selected for funding, where did they end up working? Upon completion of the Loan Repayment Program, where do participating veterinarians plan to work? For those who completed the program, where are they now?

Ask More Questions

- **Expand** shortage situation nomination forms. Ask about:
  - **Methods.** How are they selecting the shortage areas?
  - **Progress.** Has the shortage improved, stayed the same, or worsened compared to the previous year?
  - **Scope.** How many high and critical priority nominations would have been submitted if there were no limits?

Level the Playing Field

Provide Financial Resources

- **Reduce School Debt:** The debt-to-income ratio must be reduced. Veterinary schools should reduce their tuition and provide more scholarship support (Jensen, 2009). Congress should increase Veterinary Medicine Loan Repayment Program financial support for the United States Department of Agriculture to provide more scholarships.
- **Provide Location-Specific Support:** Food animal veterinarians in underserved areas should receive financial support proportional to their needs. Covering housing costs or providing sign-on bonuses are additional financial incentives to assist with recruitment.

Promote Workplace Wellness

- **Increase Mental Health and Wellness Programming:** Veterinary Services Grant Program funds should be allocated toward programs to support veterinary mental health and work-life balance. This is especially important for newly recruited food animal veterinarians (FAVs) starting work in a rural area. A support system for early recognition to address depression and burnout could increase retention of FAVs. It is important to note that these mental health programs will likely need to overcome stigma and other barriers (i.e., lack of time) by FAVs seeking care.
- **Focus on Answering the Specific Needs for Female Veterinarians:** The future veterinary workforce will consist primarily of women, so work-life balance efforts should address needs unique to a female food animal veterinarian.

Increase Food Animal Exposure

- **Expose Students to Food Animals:** Veterinary schools should make a more concerted effort to expose all students to a variety of food animals in the first year of veterinary school. Farm visits should complement lectures to make students more comfortable working around a variety of food animals (Tyler, 2006). Students will find more value in food animals if they get sufficient hands-on experience early in the school curriculum.
- **Engage Veterinary Students:** The food animal curriculum should be exciting and engaging for students (Foster, 2018; Freeman, 2005). The profession is not only about routine herd checks, infectious disease monitoring, and working with corporate producers to maximize efficiency. There are different types of production systems and health management practices, some of which are more sustainable and humane (Heleski, 2005). Food

animal veterinarians have the power to choose, support, and advocate for these causes.

- **Provide Summer Opportunities:** Increase fully funded summer opportunities for students with little prior knowledge and experience about food animals to learn more about the field. Ideally, these opportunities should start early in the program (i.e., first and second year) and continue throughout the education process.

Promote Diverse Career Paths

- **Expose Students to Non-traditional Food Animals:** There are many animals that need a veterinarian's support, such as non-traditional food animals like bees, butterflies, and birds.
- **Emphasize the Sustainable Development Goals:** The veterinary curriculum should emphasize the food animal veterinarian's role in supporting the United Nations Sustainable Development Goals (SDGs). This should be taught to all students early in the school curriculum. A more holistic understanding of their role in the context of SDGs may encourage students to pursue large animal or mixed-animal concentrations in veterinary school (NAS, 2022).

Strengthen the Support System

Increase Digital Platforms

- **Strengthen the Veterinarian-Client-Patient Relationship Through Digitization:** Telehealth allows veterinarians to triage cases and prioritize animals that need critical hands-on care. Creative telehealth platforms can give food animal veterinarians more time to equitably distribute their services across underserved areas. Telehealth also fosters regular communication between producers and veterinarians, improving overall herd health and productivity.

Assist the Support Team

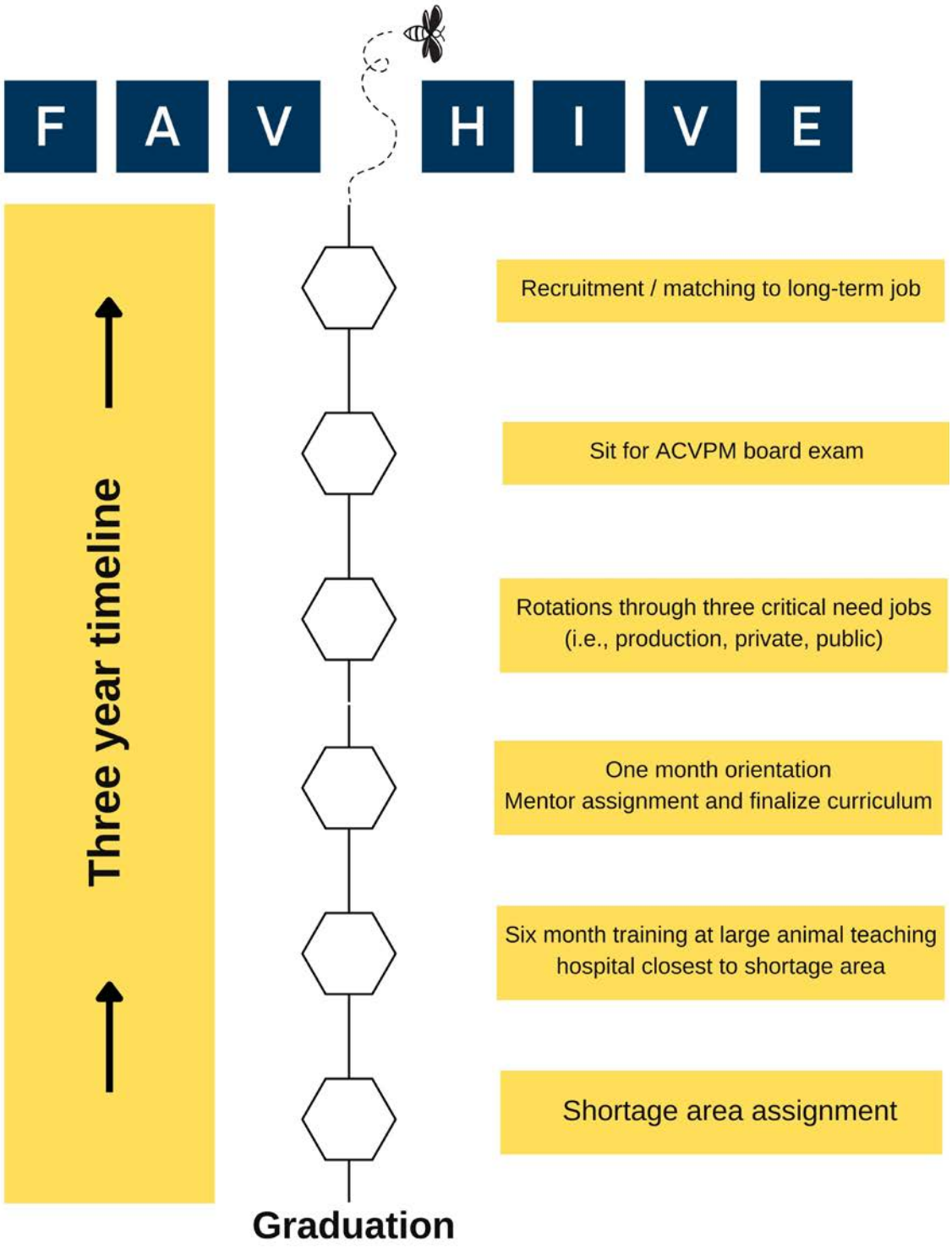
- **Use Paraprofessionals as Mediators:** A sister program to Veterinary Medicine Loan Repayment Program should be created for paraprofessionals to become licensed veterinary technicians in designated shortage areas, together with the food animal veterinarian (FAV). These graduates can relieve the FAV's workload by assisting with non-surgical tasks and acting as first responders to alleviate veterinary after-hour demands. A trained veterinary paraprofessional can also perform routine preventive measures and pregnancy checks. With paraprofessional assistance, veterinarians will have more time to focus on large-scale issues such as herd-level efficiencies, animal welfare, maximizing productivity, and improving

the farm system's impact on the environment (Remsburg, 2007). Private practices can operate more efficiently by providing basic medical care for farm animals under the remote supervision of a veterinarian (Salois, 2019). These services may also be more affordable for farmers.

Build Partnerships

- **Corporate and Private Farms Should Support One Another:** Congress should fund a grant program for veterinary care partnerships between private and corporate farms. In select states experiencing a veterinary shortage, representatives from each sector could submit a joint application for United States Department of Agriculture funding to support the hiring of a food animal veterinarian (FAV) to service their area. Funding would depend on availability and the proposed number of positions needed. A joint program would allow new FAVs to experience both small-scale, private farming as well as industrial food animal agriculture, developing well-rounded practitioners who can apply lessons in one area to another.
- **Increase Preparedness Through Annual Meetings**: Conduct annual brainstorming sessions with different stakeholders to discuss needs and explore solutions in a collaborate environment. For example, what if the AmeriCorps model was adopted to connect food animal veterinarians with shortage areas in need?

FIGURE 8. *A simplified three-year timeline for a program that matches the needs of recent graduates with the needs of shortage areas.*



FINAL REMARKS

Food animal veterinarians (FAVs) are on the verge of disappearing in the United States (NRC, 2013). This threatens food safety, the practice of good animal husbandry, and the promotion of environmental health (NRC, 2015; AVMA, 2019). The scope of the problem is unclear due to the lack of information, further compounded by the lack of consistent terminology, variation by species, and an evolving production system. Financial debt, age, lack of diversity, lack of familiarity with food animals, and mental health are the major drivers limiting the supply of FAVs. The Veterinarian-Client-Patient Relationship, antibiotic stewardship, increasing awareness of food animal welfare, and increased hobby food animals are factors driving demand. Antibiotic resistance, compromised animal welfare, increased emerging and reemerging zoonotic diseases, and economic losses were most frequently mentioned as consequences of the decline in FAVs. Possible solutions include reducing student debt, improving data collection, making changes to the core veterinary school curriculum, and strengthening the support system for FAVs.

COVID-19 has demonstrated that the cost of zoonotic disease outbreaks far exceeds the expense of preventive programs. To safeguard public health and meet the Sustainable Development Goals, we need a more robust food animal veterinary workforce. In March 2022, Congress designated millions of dollars for federal veterinary programs (AVMA, 2022a):

- **$1 million** increase in Veterinary Medicine Loan Repayment Program funding compared to last year, for a total of $9.5 million.
- **$2.5 million** towards the Food Animal Residue Avoidance Database Program to monitor for drug residues.
- **$500,000** in funding towards the Veterinary Services Grant Program (VSGP) for a total of $3.5 million. The VSGP is a federal program to support veterinary practices in rural areas through education, extension, and training.
- **$2.8 million** to address the many vacancies of public health veterinarians at the United States Department of Agriculture Food Safety and Inspection Service.
- **$4 million** for the National Bio and Agro-Defense Facility.

This is a step in the right direction. As funds are used to implement programs, it is important to remember that the shortage of food animal veterinarians is a multifaceted problem that calls for systems thinking. Better reporting and data collection, shared collaboration, and learning to adapt to the dynamic and evolving food supply chain will create a resilient workforce, willing and able to withstand future shocks and stressors.

ACKNOWLEDGEMENTS

The author is incredibly grateful to the following people for their contributions: Meghan Davis, Christine Grillo, Ruchira Gupta, Donna Hesson, Shawn McKenzie, Michael Milli, Keeve Nachman, and Natalie Wood-Wright.

The author would like to thank Marline Azevedo, Kathe Bjork, Danielle Farley, and Bob Smith from the National Institute of Food and Agriculture for their suggestion on putting together this report.

The author would especially like to thank the State Animal Health Officials who provided their time and insight towards this report. Furthermore, the author is grateful for the community members who participated in qualitative research studies addressing the impacts of regulatory requirements on animal health, welfare, and the workforce.

METHODOLOGY

A literature review was conducted to identify the drivers of supply and demand, and their related consequences. The review was supplemented with stakeholder interviews and qualitative data from 2022's Veterinarian Shortage Situation Nomination Forms for private sector shortage situations available on the National Institute of Food and Agriculture (NIFA) website. This Capstone focused on the 12 States NIFA permitted to submit seven or eight nominations, the highest two tiers of nominations allowed in the Veterinary Medicine Loan Repayment Program during the 2020-2022 nominating period. It was assumed that these tiers reflected the states in most need of food supply veterinary services. A total of 87 nomination forms from California, Colorado, Georgia, Idaho, Iowa, Kansas, Minnesota, Missouri, Nebraska, Oklahoma, Texas, and Wisconsin were evaluated.

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