

ANIMAL WELFARE

Title: Animal caretakers perspectives on performing euthanasia on commercial sow farms – **NPB #19-070**

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Industry Summary:

The objective of this study was to evaluate swine caretaker and veterinarian perceptions of euthanasia training, decision-making, challenges, and considerations for physical and mental health associated with euthanasia duties on swine operations with the intention of providing practical suggestions for improving management approach to euthanasia training and support. Euthanasia is utilized on livestock operations as a mechanism to alleviate suffering of diseased or injured animals that have little chance of recovery. Although euthanasia decisions are made with the animal's interests in mind, it is often a difficult job for caretakers and veterinarians to perform. Research exploring the impacts of performing euthanasia on people who have chosen careers based on their affinity for caring for animals has been more prevalent in veterinarians and animal shelter workers as compared to livestock caretakers and veterinarians. An online survey was developed including questions related to euthanasia method, frequency, and training; job satisfaction and well-being; attitudes towards performing on-farm euthanasia; management attitude; support networks; and demographic and background information. Researchers recruited at two industry events and via a veterinarian e-newsletter. Forty-five completed caretaker surveys (managers = 21, workers = 17, and owners = 7) and twenty-five veterinarian surveys were received. Results indicated that although most caretakers and veterinarians felt confident performing euthanasia, some identified the desire to have more euthanasia training. Veterinarians should be integral in euthanasia protocol development, training, and execution. Although the importance of euthanasia training is recognized, there is still opportunity within the swine industry to ensure all employees are properly trained. It is evident that there is also a need to provide additional training to veterinarians as integral components of the veterinary school curriculum and continuing education programming. Human safety was consistently included in euthanasia training, as it should be, but strategies to cope with personal stress and ensure emotional wellness related to this specific task were not as reliably incorporated. Although the majority of caretakers identified that there were programs to promote worker health and resources to help them cope with job responsibilities, there is still an opportunity to integrate components of mental wellness into training and on-farm support programs. Logistical factors were noted as challenges to proper and timely euthanasia and need to be addressed. Additionally, as the impact that euthanasia can have on caretaker and veterinarian mental well-being becomes more recognized in the livestock industries, it is crucial to incorporate strategies for coping with the moral stress of having to perform euthanasia into training protocols, as currently this is not broadly addressed.

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Key Findings:

- Although the euthanasia training on the respondents' respective farms was thought to be adequate, there is a desire for further euthanasia training by both caretakers and veterinarians.
- The incorporation of strategies to cope with the mental stress of performing euthanasia should be included in on-farm euthanasia training.
- Strategies to deal with the mental well-being impacts of performing euthanasia should be included into training and other management frameworks to provide support for those who make decisions about and perform euthanasia as part of their job.

Keywords: caretaker, euthanasia, pigs, training, veterinarian, worker well-being

Scientific Abstract:

Caretaker Subpopulation:

The purpose of this study was to gain a better understanding of euthanasia training, caretaker perceptions of euthanasia, and available resources for individuals who perform euthanasia as part of their job on swine operations in the United States. An online survey was distributed via an e-newsletter and in-person recruitment at swine industry events. The survey questions were related to training, attitudes towards performing euthanasia, work environment, and communication. Forty-five responses (17 workers, 21 managers, 7 owners) were recorded and summarized. The majority of workers (n = 14, 82%) agreed they had "received enough training to euthanize pigs correctly" and that training had made them "confident about performing euthanasia", yet 35% (6) also indicated they would like more euthanasia training. Less than one-third of respondents indicated that strategies for dealing with "personal stress" (4, 24%) and "emotional wellness" 29% (5) were included in training programs but the majority (14, 82%) agreed that "trainings included human safety while performing euthanasia". Most caretakers (37, 82%) agreed that they felt they could "communicate with my supervisors if they felt uncomfortable performing euthanasia. Opportunities for the future include enhancing euthanasia training opportunities and content to include more awareness of strategies to deal with stress related to euthanasia.

Veterinarian Subpopulation¹:

Euthanasia is a critical component in swine production and veterinarians play an important role in euthanasia protocol development and training. This study aimed to understand veterinarian involvement in and perspectives on euthanasia on pig farms. An online survey was disseminated both at a pig welfare conference and online via a veterinarian e-newsletter. Twenty-five veterinarians participated in the survey. The majority of respondents indicated that caretakers

¹ Sections with this footnote come directly from: Edwards-Callaway, L.N., C. Cramer, I. N. Roman-Muniz, L. Stallones, S. Thompson, S. Ennis, J. Marsh, H. Simpson, E. Kim, E. Calaba, and M. Pairis-Garcia. 2020. Preliminary exploration of swine veterinarian perspectives on euthanasia on-farm. *Animals*. 10(10) 1919. doi: 10.3390/ani10101919. Copyright is retained by authors and is permitted to be reused per *Animals* journal policy: <https://www.mdpi.com/authors/rights>.

are the individuals making euthanasia decisions and performing the task ($n = 17$, 68% and 22, 88%, respectively). The majority (22, 88%) of respondents indicated that most of the facilities with which they work have a written euthanasia protocol, and 72% (18) indicated that they assisted in protocol development. Only half of respondents (13, 52%) agreed that “all employees performing euthanasia have been trained adequately”, and 80% (20) identified an interest in delivering more training. Less than half the respondents indicated that strategies for coping with “personal stress” and “emotional wellness” (12, 48%) were included in euthanasia training. While the moral stress of performing euthanasia is recognized, there is opportunity for addressing mental well-being in euthanasia resources. Although preliminary, this study supports the need for further euthanasia training on-farm, involving veterinarians in the process.

Introduction:

Caretaker Subpopulation:

Euthanasia is a management tool utilized on livestock operations as a mechanism to alleviate animal suffering. It is critical that euthanasia decisions are made in a timely manner and performed by trained individuals in a way that minimizes pain and distress for the animal. Guidelines for approved euthanasia methods are published by national organizations such as the American Veterinary Medical Association (AVMA) [1] in addition to species-specific associations; in swine, the National Pork Board (NPB) and the American Association of Swine Veterinarians (AASV) develop and provide these materials for producers. Animal caretakers often participate in both making euthanasia decisions and performing euthanasia [2-7] and therefore having clear protocols, procedures, and training in place is essential. The NPB Pork Quality Assurance (PQA) Plus® program emphasizes both the necessity of caretaker euthanasia training and written and accessible standard operating procedures (SOPs) on-farm [8].

There are a multitude of factors impacting euthanasia decisions on livestock operations, including but not limited to, inconsistent caretaker training, lack of written SOPs, treatment decisions, and the human-animal bond [9]. The emotional impact of euthanasia on animal caretakers can be significant [10-16]. Although “compassion fatigue” has been a focus of research in companion and shelter veterinary medicine, there is limited exploration about this type of moral stress in livestock caretakers; Rollin [17] explains this concept of “compassion fatigue” from the perspective that most animal caretakers enter their line of work to benefit animals and minimize harm to them, yet the process of euthanasia, even when alleviating suffering, opposes this goal. This reversal of role in an animal caretaker’s job brings about the care-killing paradox, which is the instance whereby those who are tasked with taking care of animals are asked to make decisions about ending those same animals’ lives [12]. It has been shown that animal shelter workers and veterinarians that are asked to euthanize animals regularly experience feelings including guilt, regret, negative feelings towards themselves and symptoms related to traumatic stress [11-13, 18].

In previous studies in both companion and livestock species, animal caretakers have identified that they understand the importance of euthanasia despite the emotional stress it causes [5, 7, 12, 14, 16-17, 19]. There is an opportunity in the swine industry to explore ways to provide animal caretakers with strategies to deal with the emotional stress of having to euthanize animals that they care for. Rogelberg et al., [20] reported that for animal shelter workers, provisions of counseling, time off, and communication was needed for those performing euthanasia regularly to prevent fatigue and improve employee health. In livestock workers, it has been shown that guidance and training about euthanasia can greatly impact the feelings an animal caretaker has about their work [16, 21]. High quality support networks or resources available to caretakers impacts the likelihood of them being able to cope with job-related stress

[13]. Improving the well-being of swine caretakers who perform euthanasia would have a positive effect on the both worker and animal well-being which would also positively impact operation efficiency and sustainability.

Understanding caretaker perceptions about euthanasia and associated training, communication, and available resources will provide valuable information that can inform future euthanasia resource and program development both on-farm and broadly on an industry level. The purpose of this study was to gain knowledge on euthanasia training, caretaker perceptions of euthanasia, and available resources for caretakers who perform euthanasia as part of their job on swine operations.

Veterinary Subpopulation¹:

Euthanasia is a critical component of on-farm management used as a means to alleviate suffering of diseased or injured pigs that have little chance of recovery [1]. Veterinarians play a crucial role in the development of on-farm euthanasia standard operating procedures that are adopted and implemented on-farm by caretakers [2]. In accordance with the American Veterinary Medical Association (AVMA) *Guidelines for Euthanasia of Animals*, it is the veterinarian's duty to put the animal's best interest and welfare at the forefront when making euthanasia decisions and to ensure techniques chosen induce death rapidly and painlessly [3]. Euthanasia is critical to minimize animal suffering when animals are unlikely to return to full health or show improvement even after treatment regimens have been tried [4]. Because veterinarians are central to animal health and welfare, decision-making, training, and recommendations related to euthanasia should fall under their remit.

There are many difficulties associated with bearing the decision to end an animal's life, even when it is the most humane option for that animal. There are often psychological, emotional, and physical ailments which manifest themselves in caretakers and veterinarians that are tasked with euthanasia responsibilities [5, 6]. Considerable research has been conducted, exploring the impacts of performing euthanasia on people who have chosen careers based on their affinity for caring for animals, such as veterinarians, animal shelter workers, livestock owners, and farm employees [7, 8]. Reeve et al. [8] found that employees performing euthanasia in animal shelters often develop feelings of misdirected anger that can lead to isolation or discontent. Individuals exhibit a range of reactions to euthanasia, including anger, sadness, fear, guilt, irritability, depression, helplessness, or hopelessness [7–10], all of which are negative emotions that likely impact long-term psychological and physical well-being. The Reeve et al. [8] study also indicated that employees involved in euthanasia showed significantly higher levels of work stress, stress-induced physical ailments, work-to-family conflict, and dissatisfaction with their work. Individuals that work closely with animals, such as caretakers and veterinarians, form bonds with the animals they care for [11], making performing euthanasia a very difficult task that can have psychological repercussions on those individuals if not addressed [12,13]. Additionally, veterinarians' main focus is to keep animals healthy, diagnose and treat disease, and promote good animal management, and therefore when euthanasia is determined the best option for an animal, veterinarians may feel a sense of failure [3].

It is important for livestock operations and veterinary practices to have programs, procedures, and support available to caretakers and veterinarians to cope with the moral stress associated with performing euthanasia as part of their job. The quality of an individual's support network (family, friends, peers, supervisors, etc.) impacts how he/she copes with stress [8]. Relationships with peers and supervisors, in addition to professional psychological services, are integral to effective stress management and these relationships often provide opportunities to discuss stressful situations in a safe and private environment [9]. Other interventions implemented by

companies involve counseling resources, job rotation, assistance with job performance, breaks, support groups and meetings, open communication, training, and morale-boosting initiatives [14]. Positive mental health leads to increased job satisfaction and improves one's ability and willingness to exhibit appropriate and effective behaviors, which increases an organization's effectiveness [15–17]. Studies show that poor mental health increases employee absenteeism and turnover, which diverts organizational resources away from production [16, 18–21]. In summary, the availability of simple resources, support, and stress management tools are highly beneficial to those who must euthanize animals as part of their daily job, and this includes veterinarians.

Previous research evaluating the psychological impact of euthanasia on veterinarians has focused primarily on shelter and companion animal veterinarians. Therefore, there is an increasing need to evaluate the effects of euthanasia on production animal veterinarians. Areas requiring attention in livestock production related to euthanasia are training, written protocols, and clear communication regarding decision-making [22]. Additionally, as veterinary knowledge and guidance is critical in on-farm euthanasia decisions and training, it is essential to have adequate resources available for veterinarians to enhance the experience of caretakers when performing euthanasia. Therefore, the objective of this study was to evaluate veterinarian perceptions of euthanasia training, decision-making, challenges, and considerations for physical and mental health associated with euthanasia duties on swine operations.

Objectives:

The objectives of the proposed research were:

- 1) to evaluate caretaker perceptions of euthanasia training, decision-making, challenges, and considerations for physical and mental health associated with euthanasia duties on swine operations,
- 2) to evaluate veterinarian perceptions of euthanasia training, decision-making, challenges, and considerations for physical and mental health associated with euthanasia duties on swine operations, and;
- 3) to provide practical suggestions for improving management approach to euthanasia training and support.

Materials & Methods:

This research was approved through the Colorado State University (CSU) Institutional Review Board (#19-9050H) prior to project initiation.

The original methodology proposed was to conduct in-person or phone interviews to collect survey data. Recruitment was to occur via direct connection with producers and once interest was established researchers would travel to the location of cooperating swine facility sites and conduct interviews at an off-site location. There was limited interest from companies in this approach so the methodology was transitioned to phone interviews. Due to minimal uptake, the survey was converted to an online platform. The target population included both caretakers and veterinarians. Researchers attended two industry events to recruit: the Pig Welfare Symposium hosted in Minneapolis, MN in November 2019 (312 attendees) and the Illinois Pork Expo hosted in Springfield, IL in February (837 attendees). At both events a booth was hosted and flyers with survey information was shared with interested attendees. Additionally, the survey was shared through the American Association of Swine Veterinarians (AASV) e-newsletter (1,585 subscribers) two times. All data was collected between November 2019 and February 2020. The survey was

offered in English and Spanish. Respondents were offered a \$25 gift card for participation. All responses were anonymous and respondents could opt out of all questions except the consent form at the beginning of the survey.

The survey was developed in Qualtrics (Qualtrics, Provo, Utah) and tested prior to launching by industry and university representatives. The survey was branched by “role” (e.g. veterinarian, worker, manager, and owner) and therefore the number of questions an individual was given the opportunity to answer varied greatly by role. A variety of question types were used including but not limited to: dichotomous, multiple choice, Likert scale, rating scale, and open-ended questions. The survey was divided into the following subgroups: euthanasia method, frequency, and training; job satisfaction and well-being; attitudes towards performing on-farm euthanasia; management attitude; support networks; and demographic and background information.

Data were summarized as a veterinarian subpopulation and a caretaker subpopulation (e.g. worker, manager and owner). Fifty-nine caretaker surveys were received. Surveys less than 80% complete were not used for analysis (n = 14). The roles of respondents represented in this survey population are as follows: workers (n = 17), managers (n = 21), owners (n = 7). Twenty-five veterinarian surveys were received. In both surveys, for some questions, individuals chose not to answer; it is noted within the results when this occurred. Descriptive statistics were tabulated for all questions of interest for both subpopulations; due to the relatively small sample size, no additional statistical analysis was completed.

Results:

Results are reported by objective.

1) to evaluate caretaker perceptions of euthanasia training, decision-making, challenges, and considerations for physical and mental health associated with euthanasia duties on swine operations,

A total of 59 surveys were returned. Considering the number of attendees at the Pig Welfare Symposium (312 attendees) and Illinois Pork Expo (837 attendees), it is estimated that the survey had a response rate of 5% which is likely an overestimation due to other outlets through which the survey was shared that are not easily quantified (e.g. direct emails to producers). An additional consideration is that many of the conference attendees may not have fit the survey criteria and therefore this response rate is merely an estimate. Considering the low response rate, these data should be considered preliminary and should be followed by studies that capture a larger proportion of the target population.

Demographics & background information

Respondent demographics are shown in Table 1. Swine caretakers consisted of 17 workers, 21 managers and 7 owners all of whom identified that they worked with pigs occasionally or often. The sample was 58% (n = 26) male and 42% (19) female reporting an average age of 37 years. Most of the respondents were from the Midwest (32, 71%). The majority of respondents (30, 67%,) indicated that their native language was English and were non-Hispanic or non-Latino (30, 67% and 32, 71%, respectively). Approximately half (25, 56%) of respondents said they had not previously worked on a pig farm before their current job. Respondents were asked to report their highest level of education to which a Bachelor's degree was the most frequently selected answer (19, 42%) with the rest of the respondents varying in reported education levels.

Euthanasia method and training

Due to the branching methods of this survey, workers, owners and managers were asked different questions. These questions varied slightly in context to correspond to the specific role of the respondent on the farm where they worked. In doing so, questions relating to the methods of euthanasia and training were only available for respondents that identified as workers (n = 17).

The most highly reported method of euthanasia used for sows was penetrating captive bolt (8, 25%), but gunshot (5, 16%) and electrocution (1, 3%) were also selected as methods used. Non-penetrating captive bolt was the most highly reported method for euthanasia identified for piglets (8, 26%). Carbon dioxide (4, 13%), penetrating captive bolt (2, 7%), blunt force trauma (3, 10%) and electrocution (1, 3%) were also selected as other methods used for piglet euthanasia. In sows, no respondents indicated that they felt discomfort associated with any euthanasia method when asked “If you euthanize sows, does performing euthanasia using this method cause you discomfort?” In piglets, at least one respondent indicated feeling discomfort to all methods except carbon dioxide when asked the same question for piglets.

Workers (n = 17) were asked to provide information about the frequency of training and the type of training used for any method of euthanasia utilized on their farm. On average, respondents reported that training occurred one time per year for all methods of euthanasia used for both sows and piglets. Respondents identified that training was offered in English, Spanish, and sometimes both languages. The language the training was offered in varied by euthanasia method. Respondents indicated receiving training in the following formats: in-person outside trainer, in-person in-house trainer, video, online, written materials, and shadowing a co-worker. Questions about perceptions of training were asked in the form of agreement statements (Table 2). The majority of workers agreed with that “training has made me confident about performing euthanasia” and that “I have received enough training to euthanize pigs correctly” (14, 82%, for both). Additionally, the majority of workers agreed that “the frequency of training is adequate” and that “training is delivered in a format that helps me learn” (15, 88% and 16, 94%, respectively). The majority of respondents also (14, 82%) agreed that “trainings included human safety while performing euthanasia”. Almost a quarter (4, 24%) of respondents agreed that their trainings included “strategies to cope with personal stress” and only 29% (5) agreed that their trainings included “strategies for emotional wellness”. Nearly one-third (6, 35%) of respondents said they “would like to receive more euthanasia training”.

Euthanasia decision-making

All respondents (N = 45) were asked to identify who on their farm makes the decisions to euthanize and additionally who performs euthanasia (Table 3). Respondents were able to select multiple answers to these two questions. Approximately one-third of respondents indicated that they themselves (22, 33%) made the decision to euthanize. One-quarter of respondents indicated that a caretaker other than themselves (18, 27%), and/or a manager (16, 24%) also participated in euthanasia decision-making. When asked if they “perform euthanasia by yourself or with another staff/team member” most respondents selected “by yourself” (26, 58%) and/or “with staff member” (21, 47%).

Attitudes towards performing on-farm euthanasia

Figure 1 shows agreement statements on perception of euthanasia from caretakers (N=45). Most respondents did not “feel emotionally upset when performing euthanasia” (30, 71%) but almost half (19, 45%) indicated that “it would bother them if their job was to euthanize all the pigs that needed to be euthanized every day” and the majority (67%, 30) agreed that “euthanizing pigs becomes easier the more that I do it”. Ninety-six percent (43) of respondents agreed that “euthanasia is a humane way to end an animal’s suffering” and 93% (42) said that “it was more

humane to euthanize an animal that is suffering rather than let them die naturally.” Ninety-one percent (41) of caretakers agreed that “there are often good reasons for euthanizing pigs” and 93% (42) agreed with the statement “I feel as though the euthanasia process on the farm is necessary”.

Work environment and communication

Table 4 and 5 include information regarding mental health resources, communication and work environment (N = 45). The majority of respondents (24, 53%) indicated that there are “programs to promote worker health” (Table 4). Similarly, 58% (26) of respondents indicated that there were “employee check-ins with a supervisor or administrator”. Thirty-three respondents (73%) indicated that there were not any “mental health evaluations” at their place of work.

Figure 2 shows the responses to questions related to respondent perspectives about the workplace. Approximately three-quarters of the respondents agreed that their workplaces had “access to programs and/or training to help deal with work responsibilities” and had “adequate programs to help cope with their jobs” (29, 64% and 30, 67%, respectively). Nearly half of the respondents (20, 44%) said they had received “guidance or advice on how to manage stress in the workplace”. A majority of respondents said they felt “physically safe at work while performing euthanasia” (38, 84%), that they were “satisfied with their current job” (38, 84%) and that they felt “supported by their peers in the workplace” (87%, 39).

A majority (37, 82%) agreed that they felt they could “communicate with my supervisors if they felt uncomfortable performing euthanasia” and 89% (40) said they were “aware of proper channels in management to communicate issues” (Table 5). The majority of caretakers (42, 93%) said agreed that their “supervisors aimed to promote a safe and encouraging work environment”. When asked if respondents talked to people about work and who they talked to about feelings on performing euthanasia, respondents indicated that they most commonly talked to work peers (7 work peers on average).

Table 1: Demographics of survey respondents (N=45).

	Respondents %(n)
Role	
Worker	38 (17)
Manager	47 (21)
Owner	16 (7)
Gender	
Male	58 (26)
Female	42 (19)
Average age (years)	
	37
Location of current residence	
Midwest	71 (32)
Southwest	7 (3)
West	7 (3)
Southeast	9 (4)
Outside of North America	4 (2)
No answer	2 (1)
Ethnicity	
Hispanic or Latino	24 (11)
Non-Hispanic or Non-Latino	71 (32)
Decline to answer	4 (2)
Native language	
English	67 (30)
Spanish	24 (11)
Portuguese	2 (1)
Ukrainian	2 (1)
No response	4 (2)
Previous work on a pig farm	
Yes	40 (18)
No	56 (25)
Decline to Answer	4 (2)
Highest level of education	
No high school diploma	2.2 (1)
High school diploma	13 (6)
Some college	13 (6)
Bachelor's degree	42 (19)
Veterinary degree	7 (3)
Post Graduate degree (other than Veterinary school)	22 (10)

Table 2: The level of agreement by respondents identified as caretakers (n = 17) with various statements regarding perceptions of euthanasia training. For each statement, respondents were given the following options: strongly agree, agree, disagree, strongly disagree, and decline to answer. In this table, “Agree” represents agree and strongly agree responses and “Disagree” represents disagree and strongly disagree responses.

	Respondents		
	% (n)		
	Agree	Disagree	Decline to answer/ No answer
I have received enough training to euthanize pigs correctly.	82 (14)	12 (2)	6 (1)
The frequency of training is adequate.	88 (15)	6 (1)	6 (1)
Training is delivered in a format that helps me learn.	94 (16)	0	6 (1)
All employees performing euthanasia have been trained adequately.	88 (15)	6 (1)	6 (1)
Training has made me confident about performing euthanasia.	82 (14)	6 (1)	12 (2)
Training includes human safety while performing euthanasia.	82 (14)	6 (1)	12 (2)
Training includes strategies to cope with personal stress.	24 (4)	71 (12)	6 (1)
Training includes strategies for emotional wellness.	29 (5)	65 (11)	6 (1)

Table 3: The roles of people responsible for making the decision to euthanize animals and perform it as identified by survey respondents (N = 45). Respondents were able to choose more than one answer for each question.

**Who makes the decision to euthanize?
(multiple select answer)**

	% (n)
Respondent	33 (22)
Caretaker (other than yourself)	27 (18)
Manager (other than yourself)	24 (16)
Veterinarian	3 (2)
Owner (other than yourself)	6 (4)
Other	6 (4)
Not applicable	2 (1)

**Do you perform euthanasia by yourself or with another staff member/team?
(multiple select answer)**

	% (n)
By yourself	58 (26)
With staff member	47 (21)
No response	6 (3)

Table 4. Questions related to availability of health resources (N= 45).

	Yes	No	Decline to answer/ No answer
Are there programs to promote worker health?	53 (24)	38 (17)	9 (4)
Are there any mental health evaluations?	16 (7)	73 (33)	11 (5)
Are there employee check-ins with a supervisor or administrator?	58 (26)	33 (15)	9 (4)

Table 5. Agreement statements related to work environment and communication in the workplace (N=45).

	Agree	Disagree	Decline to answer/No Response
I feel as though I can communicate with my supervisors if I feel uncomfortable performing euthanasia.	82 (37)	9 (4)	9 (4)
I am aware of proper channels to communicate issues to management.	89 (40)	2 (1)	8 (4)
My supervisors aim to promote a safe and encouraging work environment.	93 (42)	0	7 (3)

Figure 1: The level of agreement by respondents (N = 45) with various statements regarding perceptions of euthanasia. For each statement, respondents were given the following options: strongly agree, agree, disagree, strongly disagree, and decline to answer. In this figure, “Agree” represents agree and strongly agree responses and “Disagree” represents disagree and strongly disagree responses. “Decline to answer” also includes respondents that provided no selection.

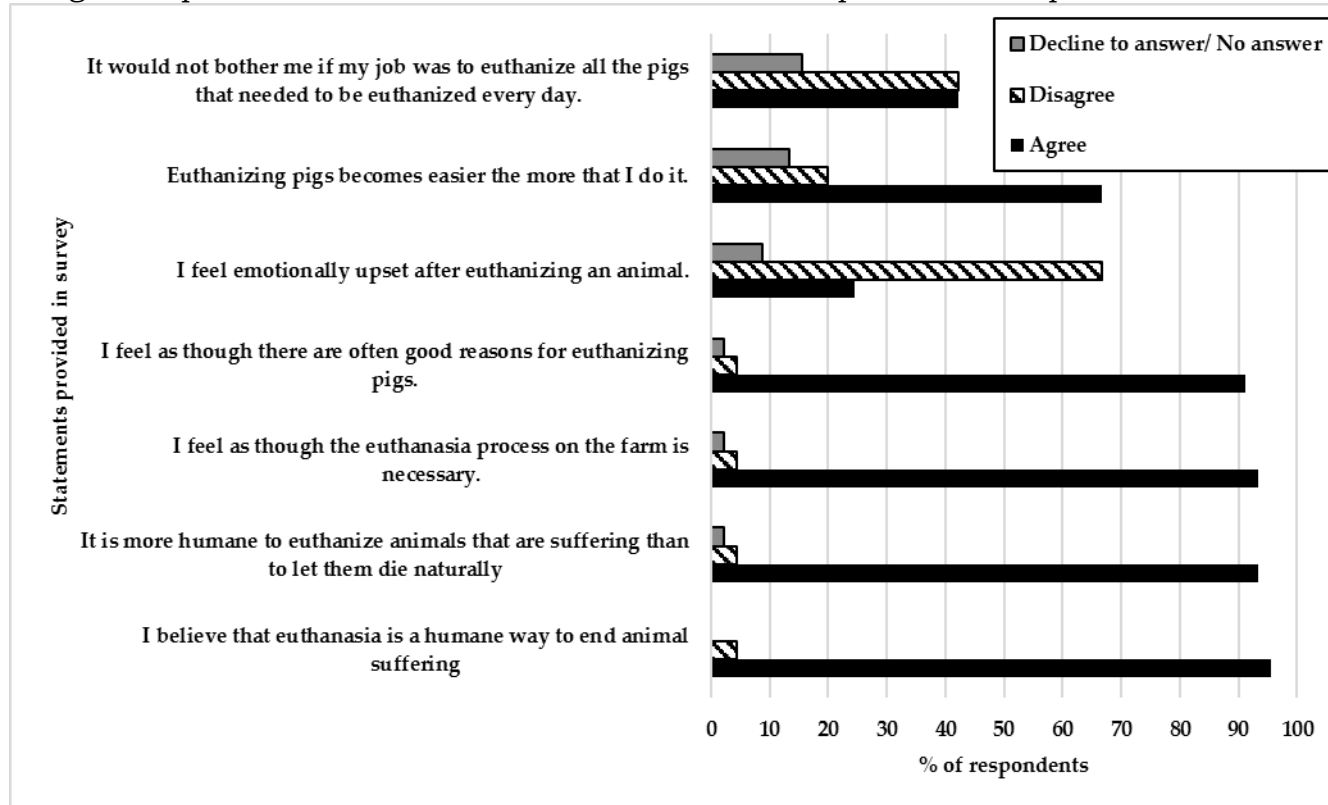
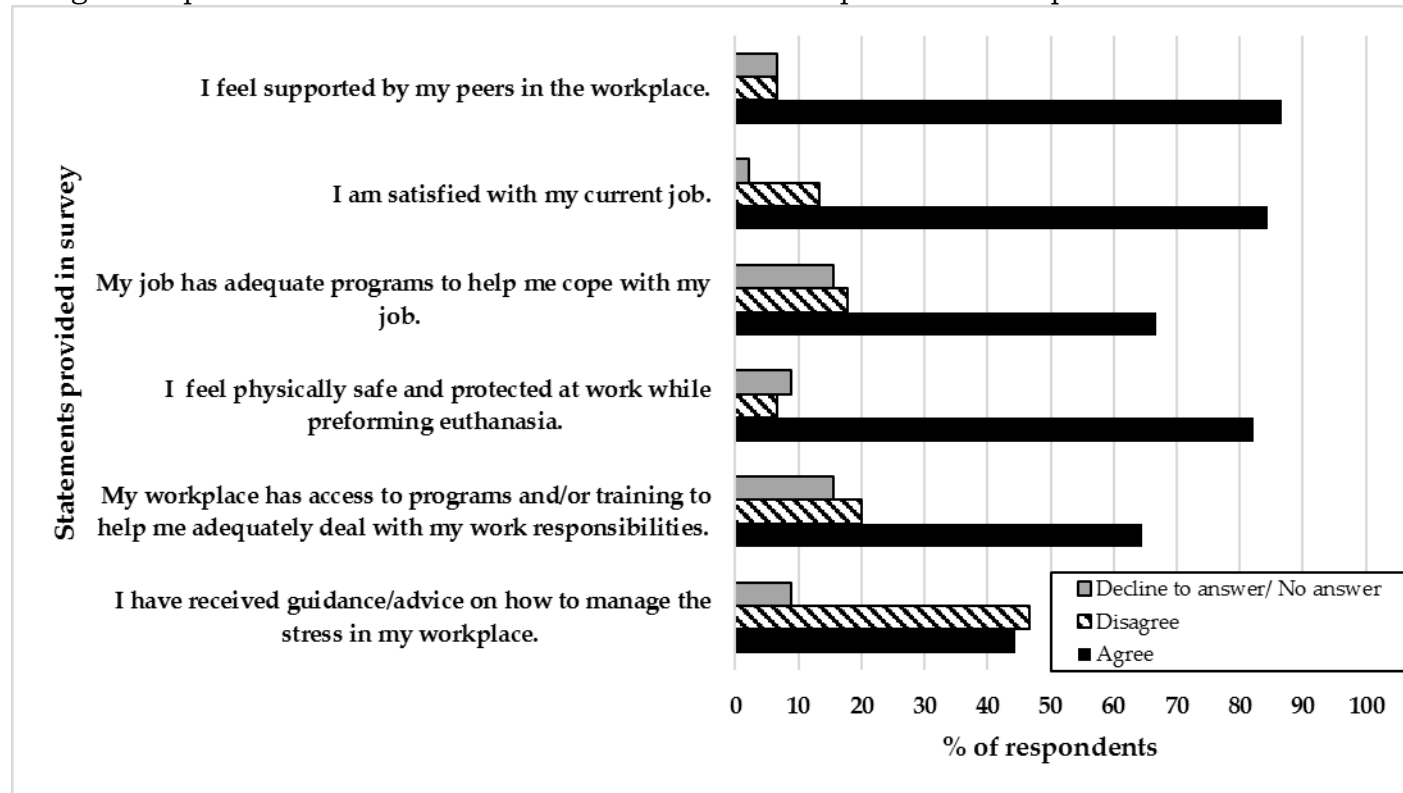


Figure 2: The level of agreement by respondents (N = 45) with various statements regarding perceptions of the workplace. For each statement, respondents were given the following options: strongly agree, agree, disagree, strongly disagree, and decline to answer. In this figure, “Agree” represents agree and strongly agree responses and “Disagree” represents disagree and strongly disagree responses. “Decline to answer” also includes respondents that provided no selection.



2) to evaluate veterinarian perceptions of euthanasia training, decision-making, challenges, and considerations for physical and mental health associated with euthanasia duties on swine operations, and;¹

Twenty-five surveys were returned. There were 312 attendees at the Pig Welfare Symposium. The American Association of Swine Veterinarians (AASV) electronic newsletter was distributed to 1585 subscribers. It is estimated that the response rate was at least 1.3%, as not all the conference attendees were veterinarians, and thus not all were eligible to participate in the survey. Due to this relatively low response rate, we will consider the results preliminary, warranting further exploration with a larger sample population.

Demographics

The demographics of the respondents are summarized in Table 1. Two-thirds of the survey respondents ($n = 16$, 64%) identified as female. Most of the respondents were from the Midwest (17, 68%; U.S. regions as defined in O'Connor [24]). The majority of respondents identified as non-Hispanic or non-Latino (22, 88%) and indicated English as their native language (20, 80%). Approximately one-third of respondents indicated they either served “multiple companies with several site locations” (9, 36%) or “one company with several site locations” (9, 36%). Slightly less than half of respondents (11, 44%) indicated that they had previous employment with other swine operations within the United States.

Veterinarian Involvement with Euthanasia Responsibilities

The majority of respondents indicated that they “work with pigs often” (22, 88%). The other 12% (three) identified that they “work with pigs occasionally”. All respondents except one indicated that they had euthanized at least one pig in the past 12 months. Respondents were asked to identify the most common method they used for euthanizing sows and piglets (Table 2). The majority of respondents (16, 64%) indicated that captive bolt was the most common euthanasia method they used for sows; however, the following were also identified: injection, gunshot, electrocution, and blunt force trauma. When asked about piglets, a third of respondents (9, 36%) indicated that blunt force trauma was the most common method of euthanasia they used; however, the following methods were also provided: carbon dioxide, non-penetrating captive bolt, injection, and electrocution. Respondents were asked an open-ended question regarding “what determines which euthanasia method is used”. Many respondents provided multiple answers, including: animal characteristics (e.g., size and age of the pig), the written protocol at the facility, industry guidelines and policies (e.g., National Pork Board (NPB), AASV), the condition of the animal (i.e., is it suffering?), the safety of the method for employees, and the humaneness of the method.

Although the majority of respondents (20, 80%) indicated that they had a veterinary–client–patient relationship (VCPR) with the operations they work with, 12% (three) indicated they did not have a VCPR and 8% (two) declined to answer. Respondents were asked if the swine facilities where they served as a veterinarian had a written protocol for euthanasia, to which the majority indicated “yes” (22, 88%). Although still a majority (18, 72%), fewer respondents indicated that they were involved in authoring the euthanasia protocol; the remaining respondents indicated that either they were not involved in the creation of the protocol (4, 16%) or answered “not applicable” (3, 12%).

Respondents were asked several questions regarding euthanasia decision-making. Figure 1a, b illustrates the different roles of individuals involved in euthanasia decision-making on-farm. Three-quarters of respondents (19, 76%) indicated that someone other than the respondents themselves (i.e., the veterinarian) makes euthanasia decisions (Figure 1a). When asked to identify the person’s role who makes euthanasia decisions, 68% (17) of respondents indicated that animal caretakers/employees are making euthanasia decisions (Figure 1b). Managers and owners were also identified as making decisions about euthanasia (5, 20% and 2, 8%, respectively). Additionally, the majority of respondents (20, 80%) indicated that clients “sometimes/a few cases” consulted them before euthanizing a pig (Table 3). Only one respondent (4%) indicated that they were “always/every case” consulted. When asked about the role of individuals who perform euthanasia, 88% (22) of respondents indicated that animal caretakers/employees perform euthanasia on the farms they work with (Figure 2).

Training

Respondents were asked an open-ended question regarding how they deliver euthanasia training on-farm. Many respondents provided a combination of methods, including in-person training, presentations, manuals, videos, and hands-on learning. Almost all respondents provided a description that suggested an in-person component to euthanasia training. Language used to describe in-person components included: on-site, one-on-one practical training, on-farm, hands-on, and in-person. Respondents were provided with multiple statements related to training and asked to indicate their level of agreement (Figure 3). Although approximately half of respondents (13, 52%) either agreed or strongly agreed that “all employees performing euthanasia have been trained adequately”, 44% (11) disagreed or strongly disagreed with this statement. Most respondents (22, 88%) agreed or strongly agreed that “training materials are available on the

farm for review". The vast majority of respondents (23, 92%) agreed or strongly agreed that "training includes human safety while performing euthanasia", whereas slightly less than half of respondents indicated agreement with statements asking about the inclusion of "emotional wellness" and "personal stress" (12, 48% for both statements). When asked about their own training, 56% (14) disagreed or strongly disagreed that they "received adequate euthanasia training in veterinary school". Approximately one-third of respondents (8, 32%) indicated that they disagreed or strongly disagreed that they "received adequate continuing education training regarding euthanasia". Additionally, the majority of respondents (20, 80%) agreed or strongly agreed that they "would like to deliver more euthanasia training".

Wellness Programs

Approximately half of respondents (12, 48%) indicated that there are "programs to promote worker health" at the facilities with which they work. Only one respondent (4%) indicated that there were "mental health evaluations" and 36% (nine) indicated there were "employee check-ins with a supervisor or administrator". When asked for further clarification on the details of these programs and evaluations, some of the open-ended responses included: workplace safety programs, annual evaluations of work, overall wellness exams, monthly wellness topics, programs through health insurance, and counseling through employee assistance programs. Approximately half of respondents (12, 48%) knew what mental health care resources were available in their communities; 8% (two) of individuals indicated that this question was "not applicable".

Only one respondent (4%) disagreed about feeling they could communicate with supervisors if feeling uncomfortable performing euthanasia; five (20%) respondents did not provide an answer to the statement. When asked about the number of friends, relatives, and work peers that respondents can communicate with regarding their feelings about euthanasia, the reported ranges were 0 to 25, 0 to 20, and 0 to 100, respectively.

Perceptions and Communication about Euthanasia

All respondents (25, 100%) agreed or strongly agreed with the following statements: "euthanasia is a humane way to end suffering", "it is more humane to euthanize animals that are suffering than to let them die naturally", "there are often good reasons for euthanizing pigs", and "the euthanasia process on farm is necessary". Only one individual (4%) responded that they did not "have enough experience and knowledge to know when to euthanize a pig". Approximately two-thirds (15, 60%) of respondents agreed or strongly agreed that they "feel emotionally upset after euthanizing an animal" and 52% (13) indicated agreement with the statement "euthanizing pigs becomes easier the more I do it" (Figure 4). Less than a third (7, 28%) of respondents agreed or strongly agreed that "it would not bother me if my job was to euthanize all the pigs that needed to be euthanized every day" (Figure 4).

Respondents were asked if there was any aspect of the euthanasia process that bothers or distresses them. A number of respondents indicated that death is itself just difficult to deal with because it is complicated and emotional but there is comfort knowing it is ending animal suffering. For instance, one respondent shared: "it is always bothersome to euthanize an animal; however, it is comforting to know that, when performed, it is done to end an animal's suffering in a humane way so that the animal feels no pain". Another common response was that it is distressing when euthanasia is performed improperly, whether that is due to lack of caring on the part of the person performing euthanasia, or inappropriate or ill-maintained equipment. When asked if there were any additional thoughts to share, only a few respondents shared some thoughts, with one in particular related to perspectives about euthanasia: "Euthanasia shouldn't become "easier" the more it's done, because you should still feel empathy for the animal while

recognizing that they should not have to endure prolonged suffering. Euthanasia will always have an emotional burden attached to it, because if it became “easy” then there is no humanity/empathy involved in respect to the animals’ life”.

Challenges, Resources, and Needs

Respondents were asked where they currently get most of their information on euthanasia methods. Respondents mentioned all of the industry organizations that have relevant information regarding euthanasia, including: AASV, AVMA, NPB (generally and with specific mention of the Pork Quality Assurance program), the World Organization for Animal Health, North American Meat Institute, and the National Pork Producers’ Council. Other responses included some regional-specific resources, scientific literature, and conferences. Respondents were asked an open-ended question to indicate what resources or materials regarding euthanasia would be beneficial to them as veterinarians. Several individuals indicated that they have enough material and access to resources. The majority provided suggestions with general thoughts related to alternate methods of euthanasia for certain animal types (e.g., piglets, large pigs), detailed guides specific to certain sites, training materials for employees that are concise and relevant to them, and options for mass euthanasia.

Respondents were asked to share some unexpected challenges with euthanasia at the operations they work with. Many respondents mentioned equipment and operator errors; comments were shared regarding lack of equipment maintenance, malfunctioning equipment, individuals performing the job incorrectly, and general equipment needs. Additionally, staff turnover and having inconsistent protocols were mentioned as challenges. Timely euthanasia was mentioned as a challenge by several respondents; interestingly, a couple of comments identified that the issue with timeliness often came from an “overabundance of compassion” and a “desire to keep the pigs alive”. “Risks to mental health” and “new caretakers’ resistance and uncomfortable reactions to the process” were also included in responses.

Table 1. Demographics of survey respondents (N=25).

	Respondents %(n)
Gender	
Male	36 (9)
Female	64 (16)
Age (years)	
Average	38.6
Range	27 to 62
Location of Current Residence¹	
Midwest	68 (17)
Southwest	4 (1)
West	4 (1)
Southeast	4 (1)
Outside of North America	20 (5)
Ethnicity	
Hispanic or Latino	8 (2)
Non-Hispanic or Non-Latino	88 (22)
Decline to answer	4 (1)
Native Language	
English	80 (20)
Spanish	4 (1)
Portuguese	4 (1)
Polish	4 (1)
Dutch	4 (1)
Korean	4 (1)
Years with current employer² (years)	
Average	5.9
Range	0.6 to 14.7
Role as a swine veterinarian	
Multiple companies with several site locations	36 (9)
One company with one site location	8 (2)
One company with several site locations	36 (9)
Other ³	16 (4)
Decline to answer	4 (1)
Previous employment with other US swine operations	
Yes	44 (11)
No	40 (10)
Decline to Answer	16 (4)

¹Two respondents did not answer (n = 23)

²Regions were defined as done in O'Connor [24].

³Respondents who selected "Other" indicated the following: researcher/veterinarian at university farm, part of production well-being team, works with independent producers in the show pig industry, and technical services veterinarian.

Table 2. Respondent answers when asked to indicate “the most common euthanasia method you use” for sows and piglets (N = 25). Respondents were asked to fill in the method, no options were provided.

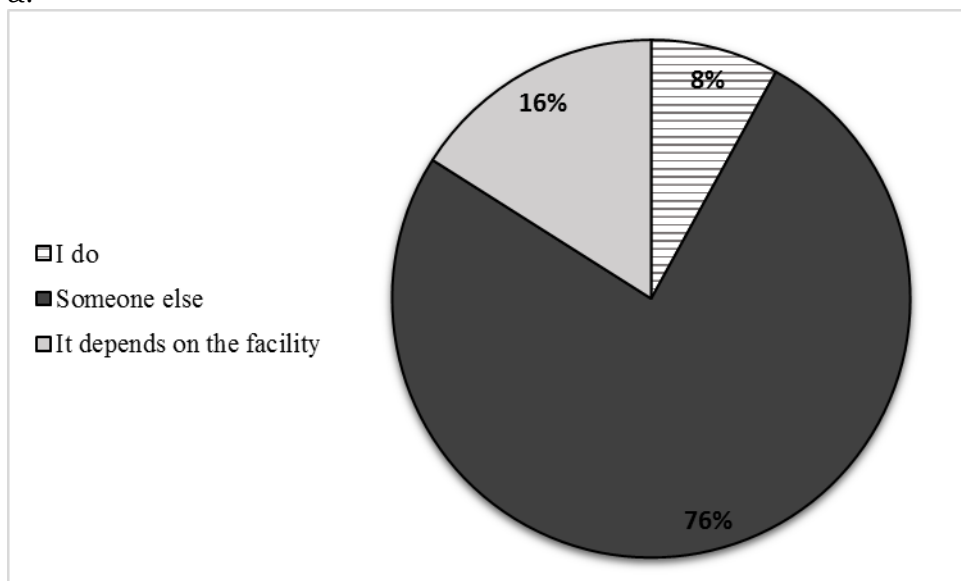
Method of euthanasia	Respondents %(n)
<i>Sows</i>	
Captive bolt	64 (16)
Injection	12 (3)
Gunshot	8 (2)
Electrocution	8 (2)
Blunt force trauma	4 (1)
No response	4 (1)
<i>Piglets</i>	
Blunt force trauma	36 (9)
Carbon dioxide	28 (7)
Non-penetrating captive bolt	20 (5)
Injection	8 (2)
Electrocution	4 (1)
No response	4 (1)

Table 3. Respondents were asked “In the past 12 months, how often did your clients consult you before euthanizing a pig?” (N = 25).

Frequency of consultation	Respondents %(n)
Always /every case	4 (1)
Often / most cases	4 (1)
Sometimes / a few cases	80 (20)
Never / no cases	12 (3)

Figure 1 a, b. Respondents were asked about decision making around euthanasia (N = 25). a) Respondents were asked “On most of the facilities where you serve as a veterinarian, who makes the decision to euthanize?” The options provided for selection were: I do, someone else, it depends on the facility. b) Respondents were asked “If someone else makes the decision to euthanize, what is this person’s role?” The options provided for selection were: farm owner, farm manager, animal caretaker/employee, it depends on the facility, or decline to answer.

a.



b.

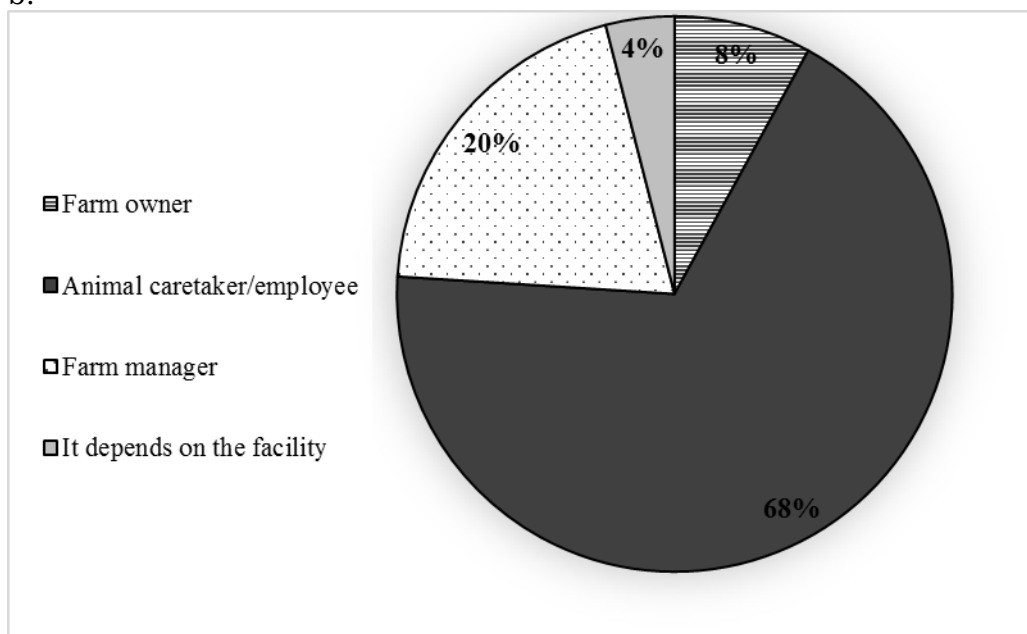


Figure 2. Respondents were asked “If someone else performs most of the euthanasias, what is this person’s role?” (N = 25). The options provided for selection were: farm owner, farm manager, animal caretaker/employee, other, or decline to answer.

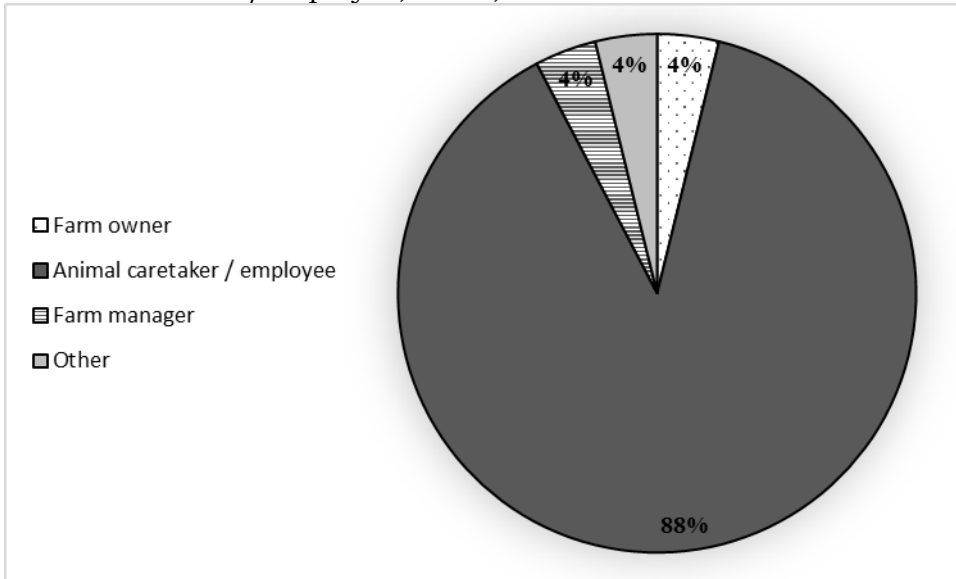


Figure 3. Respondents (N = 25) were asked to indicate their level of agreement with various statements related to euthanasia training. The options available to choose from were: Decline to answer, Strongly agree, Agree, Disagree, and Strongly Disagree. Some respondents did not answer the question.

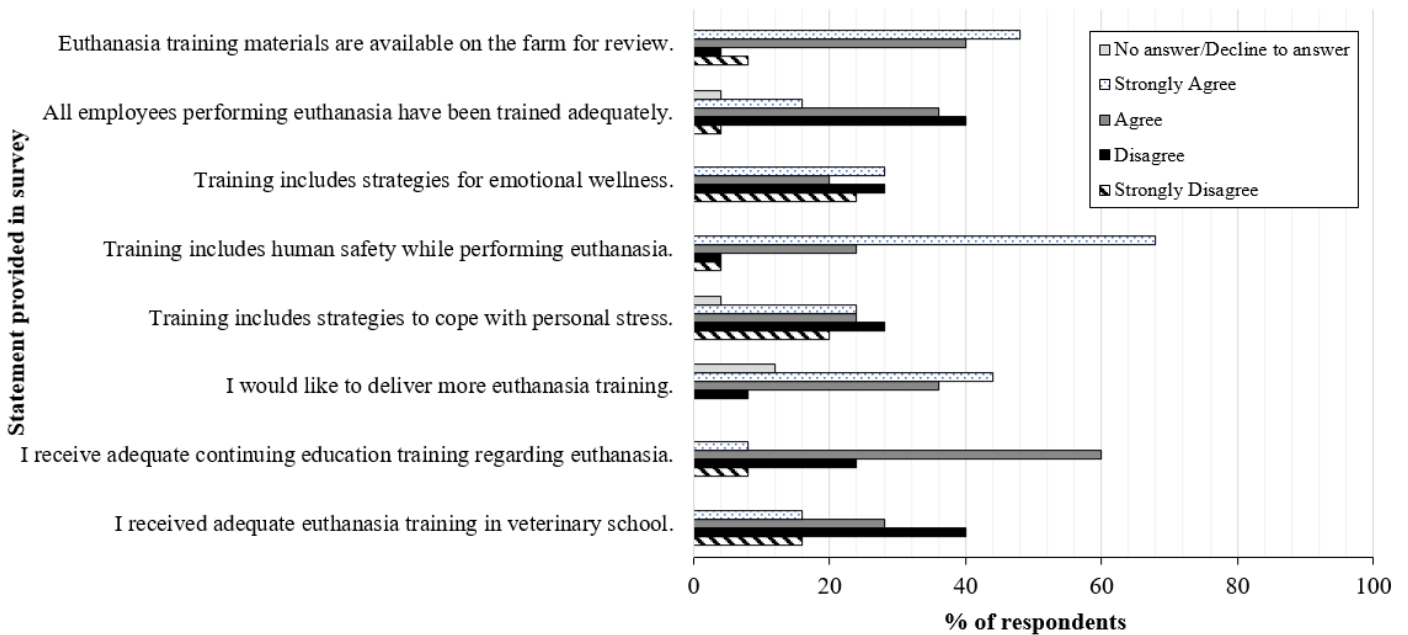
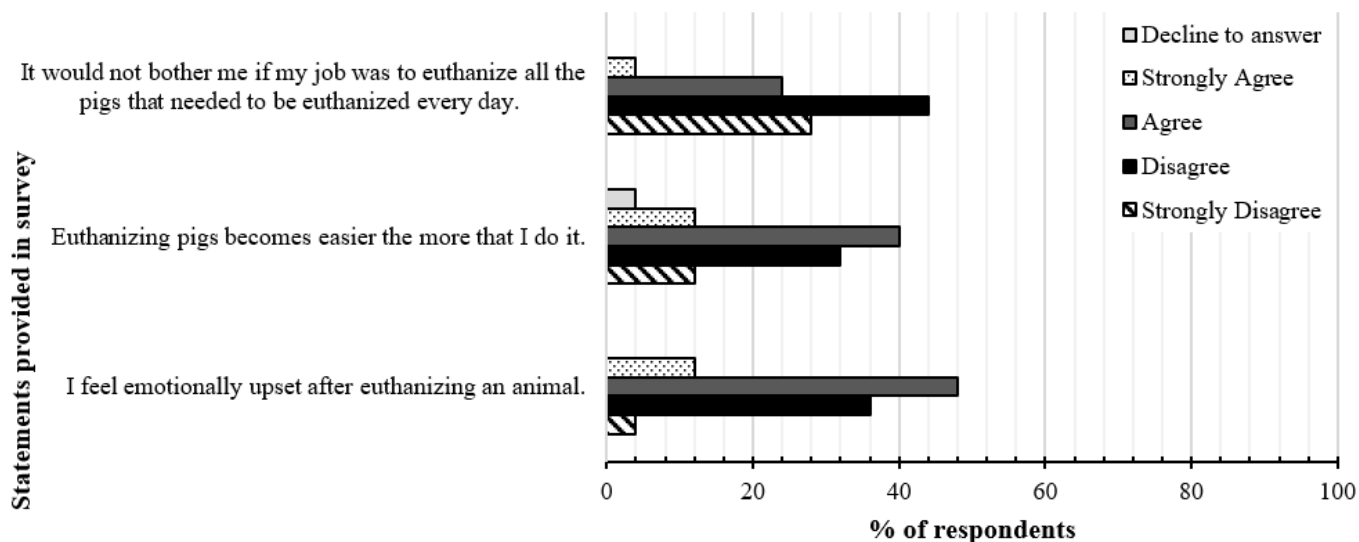


Figure 4. Respondents (N = 25) were asked to indicate their level of agreement with various statements related to perceptions about euthanasia. The options available to choose from were: Decline to answer, Strongly Agree, Agree, Disagree, and Strongly Disagree.



3) to provide practical suggestions for improving management approach to euthanasia training and support.

This is included in the Discussion portion of the final report – “Summary of Results” subheading.

Discussion:

Caretaker Subpopulation:

The results summarized in this study represent forty-five swine caretakers, a relatively small sample size. Reaching individual animal caretakers that met the criteria for the survey was a challenge and future studies should explore innovative recruitment techniques (e.g. social media posts) and different survey delivery mechanisms (e.g. in-person on paper vs online). The majority of the respondents were non-Hispanic and spoke English as their native language. The 2015-2016 US Department of Labor National Agricultural Workers Survey (NAWS) reported that within the agricultural industry, over three-quarters of agricultural workers primarily speak Spanish [22]. The NAWS report also indicated that, nationally, agricultural workers are predominantly male (68%) with an average age of 38 [22]; the current study population aligns with reported national age and gender statistics for agricultural workers. Nationally, 35% of agriculture workers have completed some adult education [22] as compared with the current study population in which 42% had attended some college and 22% had a post-graduate degree (other than veterinary school). These differences in study population demographics as compared with national statistics of agricultural workers highlights the potential bias in participant recruitment methods. Attendees at the two industry events, where a substantial amount of recruitment occurred, likely did not represent the US population of swine caretakers but rather this subpopulation probably came from progressive operations, held managerial or supervisory roles, and attended more years of formal education. These limitations should be considered when evaluating study conclusions.

One of the objectives of this project was to gain information about euthanasia training on pig farms. The PQA Plus® handbook specifies that euthanasia training should be documented and that caretakers should be able to explain: the method of euthanasia, the handling of animals

during the euthanasia process, and insensibility and confirmation of death [8]. The PQA Plus® handbook also indicates that a written standard operating procedure (SOP) for euthanasia should be accessible on-farm; although not stated in the handbook, accessibility means both visually available and provided in the native language of individuals performing the particular task [3].

The majority of workers participating in this study agreed that “all employees performing euthanasia have been trained adequately” and that they themselves have “received enough training to euthanize pigs correctly.” Follow-up questions were not asked to determine why respondents felt training was adequate but other agreement statements indicated that worker respondents agreed that “the frequency of training is adequate” and “training is delivered in a format that helps me learn” pointing to frequency and delivery format as relevant training components for learners. Previous research, specifically with swine caretakers, has indicated that on-farm training is preferred over other platforms (e.g. written materials or videos), but that supplemental classroom instruction is still valuable in education on euthanasia [23]. Additionally, workers in this study indicated that they feel euthanasia becomes easier the more it is done; this relates to comfort with the task but also the skill that comes with continued hands-on experience. Similar results related to increased comfort with increased experience has been reported in veterinarians [5]. Recent research efforts have explored the use of innovative delivery methods for euthanasia training with swine caretakers (i.e. interactive computer-based training) with success in improving knowledge post-training [7]. In regards to frequency, in the current study respondents indicated that on average euthanasia training occurred once a year. Many industry guidelines and assessment tools require annual training for livestock caretakers, euthanasia training being a component of general animal care training [8, 24, 25]. The optimal frequency of training needed to optimize knowledge retention, skill, and confidence specific to making decisions about and performing euthanasia has not been extensively explored. In a review of factors impacting training in Spanish-speaking livestock workers, Roman-Muniz et al. [26] outlined the importance of many factors essential to maximizing the benefit of training initiatives, including consistent follow-up and retraining. Langley and Morrow [27] identified the importance of conducting training multiple times in part due to staff turnover and subsequent on-boarding of new employees. There is opportunity to further explore factors that impact the effectiveness of training and retraining on specific outcomes related to both job performance and worker attitudes.

Workers were asked to select all methods of euthanasia training they had experienced by selecting from a provided list of training options. Respondents indicated the use of multiple training methods including: in-person outside trainer, in-person in-house trainer, videos, online materials, written materials, and shadowing a co-worker. As animal caretakers become more familiar with the euthanasia process via training and review of protocols, the stress of performing the task decreases [2]. Turner and Doonan [2] suggest that the euthanasia protocol should be readily available for caretakers and that training should include explanation of the dying process so that individuals are prepared for what to experience. Matthis [28] indicated that an understanding of the physiological components of euthanasia could improve comfort level for workers who deal with euthanasia and thus improve job satisfaction. For training to be effective in adult learners, regardless of the topic area, they must understand ‘why’ things need to be done a certain way to appreciate the value and importance of their work [21]. This comprehensive approach to including both the ‘how’ and the ‘why’ should be considered in future euthanasia training development efforts within the livestock industry.

English was the primary language used for training across all methods of euthanasia for both sows and piglets. This would be expected as over half (67%) of respondents said their primary language was English. For the other third of respondents that defined themselves as non-native English speakers, there was limited data as to what language they were trained in (due to

unanswered questions). A third of the non-native English speakers indicated that training was offered in both English and Spanish. Most non-native English speakers (77%, 10) identified their proficiency in English as "I speak it well" when asked about their second language proficiency. "As stated almost three-quarters of agriculture workers are primarily Spanish speaking [22] so it would be important to offer trainings and communication in Spanish as needed on operations. The US swine industry has animal care education resources available in Spanish [29, 30] but some other livestock associations that develop and produce animal care guidelines and training resources only have English versions or very limited Spanish versions available [31, 32], with current efforts underway to have Spanish materials made available. The importance of culturally congruent training on dairy operations is emphasized in previous research and among other essential components the importance of offering bilingual training when necessary has been emphasized [26, 33-35]. Priority should be placed on updating training materials to address the needs of the workers.

Despite the fact that most workers indicated that euthanasia training was adequate, approximately one-third of respondents indicated that they would like to have more euthanasia training. Similarly, in other studies in swine and dairy caretakers, individuals have indicated a desire for more training with particular mention of in-person, on-the-job training [23, 28, 33]. In similar survey studies with livestock veterinarians, the participating veterinarians have indicated the desire to conduct more euthanasia training [3, 5]. Furthermore, the importance of including livestock veterinarians in on-farm euthanasia training and protocol development has been articulated in multiple studies [2, 9, 26]. This shared desire to participate in more training both from the perspective of the trainer and the trainee identifies an area of opportunity to enhance current euthanasia training programs and strengthen veterinarian involvement.

Worker respondents were asked if they agreed with statements about the inclusion of "human safety," "strategies to cope with personal stress", and "emotional wellness" in euthanasia training. All worker respondents except two, one disagreed and one did not provide an answer, indicated that human safety is included in euthanasia training. General health (physical) and safety of livestock workers on-farm, primarily related to on-the-job injury, respiratory conditions, and zoonotic disease exposure [27, 33, 35-40] have received relatively more attention in regards to preventative measures and program development as compared to some other aspects of worker well-being, i.e. mental health. Less than one-third of survey respondents indicated that strategies for dealing with "personal stress" and "emotional wellness" are included in training programs. Similarly, in a related study with swine veterinarians, just over half of the respondents indicated that these components were not included in euthanasia training [5]. As mentioned, the moral stress that comes from having to perform euthanasia has been continually acknowledged so the inclusion of techniques for addressing this stress in euthanasia training is an area in need of attention.

The vast majority of respondents identified in their responses to agreement statements about euthanasia that they felt there were "good reasons for euthanizing pigs", that the process "is necessary", and that it was a "humane way to end animal suffering". These sentiments are often those identified by caretakers as helpful in dealing with the stress of euthanasia, i.e. acknowledging the importance of euthanasia for animals in need [12, 14, 17, 19]. It is notable that most respondents also articulated that euthanasia is a more humane option as compared to natural death; this is an important finding as it may be a helpful discussion point when teaching caretakers about making timely euthanasia decisions on-farm. Despite the difficulty in performing euthanasia, individuals still respect and understand the necessity of having this option available to end animal suffering. Interestingly, the majority of respondents shared that they did not "feel emotionally upset after euthanizing animals" and just under half also indicated that they would not be bothered if their job was to "euthanize all the pigs that needed to be

euthanized every day”. Further questioning was not included to determine why respondents felt this way but it is thought that these feelings relate to a caretaker’s sense of duty and empathy towards the animals under their care.

Over half of the respondents indicated that the farms they worked on had programs to promote worker health and that there were employee check-ins with supervisors. Although this is the majority, there was still almost a third of respondents indicating that these resources were not available, which is concerning. Even fewer respondents (16%) identified that mental health evaluations were a part of workplace programming. As mentioned, physical health and safety is often addressed at the workplace; in this study, every respondent agreed that their “supervisors aim to promote a safe and encouraging work environment.” It is critical to consider inclusion of other aspects of worker wellness into training and health and safety programming. Particularly in the context of this paper, euthanasia can be a source of emotional stress for animal caretakers and therefore more attention should be given to resource development relevant to this specific type of job-related stress.

When asked more detailed questions about communication, the majority of respondents indicated that they understand who to communicate with and feel comfortable communicating with supervisors if they feel uncomfortable performing euthanasia, suggesting a positive work environment. Additionally, in responses to agreement statements about perceptions of the workplace, the majority of respondents once again provided feedback that they feel “supported by peers”, “physically safe and protected at work”, feel “satisfied with my current job” and “have access to programs and/or training to help me adequately deal with my work responsibilities.” It is important to note that although the majority of respondents shared positive feelings about the workplace, there were a few individuals that did not and it is important to consider perceptions of all employees. Additionally, when asked about “receiving guidance/advice on how to manage stress at the workplace”, almost half of the respondents indicated they did not agree this type of guidance was provided. This feedback supports previous discussion about the importance of developing and providing resources to caretakers to support them in dealing with potentially stressful parts of their job, e.g. euthanasia. The availability of resources, support, and stress management tools will improve worker well-being which will concurrently positively impact an organization’s effectiveness through enhanced job satisfaction [41-43].

Veterinary Subpopulation:¹

The survey population in this study differed from published reports of food animal veterinarian demographics in the United States [25]. Food animal-exclusive veterinary medicine is dominated by men (77%), whereas women constituted the majority (64%) of the respondents in this survey [25]. A 2012 AVMA Workforce Survey reported that 54 years was the median age of the survey population, an older population than the current study (median = 35 years) [26]. The upper Midwest region of the United States, including states such as Iowa, Illinois, Minnesota, and Michigan, contain a higher concentration of food animal-exclusive veterinarians, paralleling the demographics of the respondents from this survey [27]. These differences in demographics and the relatively small sample size should be taken into account when considering the results from this study.

The objective of this study was to explore the perspectives of swine veterinarians on euthanasia with specific interest in euthanasia decision-making, training, impacts on mental wellness, and challenges. It is evident from responses across survey questions that while the participating veterinarians affirmed the importance of euthanasia and its essential role in swine management, they also recognized the difficulties with performing the task. Challenges identified by veterinarians ranged from having well-maintained equipment to the emotional burden of having

to take an animal's life even if the best option for the animal. These feelings are not unique to these study respondents and have been reported repeatedly in research conducted in a variety of animal industries [5, 7, 23, 28–30].

In the current study, over half of the respondents noted feeling emotionally upset after euthanizing animals and slightly less agreed that euthanasia becomes easier the more you do it. A quote shared earlier identified that in theory euthanasia should never get easier or the empathy needed would be diminished. That being said, individuals must balance the emotional strain of maintaining care for animals with the need to protect one's own mental wellness. In one of the foundational studies of livestock worker perspectives of euthanasia, Matthis [31] found that despite understanding the importance of euthanasia to swine welfare, nearly half of the participants would be content to not have to perform euthanasia. Interestingly, despite the noted negative emotions associated with performing euthanasia, approximately a third of respondents in the current study indicated they would not mind if performing euthanasia was solely their responsibility. A follow-up question was not asked to determine why respondents felt this way but perhaps individuals, veterinarians and caretakers alike, take on the extra burden of performing euthanasia because they know they will do it correctly. Campler et al. [30] reported that swine caretakers characterized as "confident and empathetic", on average disagreed that if given the choice they would "prefer someone else to euthanize pigs rather than myself", demonstrating a desire to do what is right for the animal even if it causes them moral stress. Individuals that care for animals can often find consolation when reminding themselves that euthanasia is humane, important, and necessary for the animals in need [7,9,32–33]. When asked about challenges with euthanasia on-farm, many respondents noted logistical issues related to improperly maintained equipment, the need for additional resources, alternate methods, and challenges with certain animal types. Mullins et al. [1] similarly identified logistical challenges as common barriers to timely euthanasia, including equipment availability and maintenance. In a thematic analysis of dairy veterinarian focus groups, Wagner et al. [23] reported logistical factors, including financial/economical, protocols/procedures/guidelines, client/operation/farm size, carcass disposal, time/labor/space, equipment, and ownership, as common barriers to timely euthanasia on dairies. All these logistical factors are fixable over time and can be addressed through standard operating procedures, training, etc. However, many of these issues are interconnected and the presence of multiple logistical factors compounds challenges faced by veterinarians. Although not a directly asked question in this survey, some respondents identified mass euthanasia as a challenge. This has been mentioned in other studies as well, specifically related to porcine epidemic diarrhea virus (PEDv) [1], John's disease [34], and foot and mouth disease [35]. Considering some of the recent challenges experienced with the COVID-19 pandemic, veterinarian and caretaker perspectives of mass euthanasia and depopulation is an area worthy of further exploration.

Discussions regarding euthanasia protocols and decision-making should be part of the established duties of the veterinarian on-farm [36]. A VCPR is the basis for interaction between veterinarians and their clients and patients. The importance, necessity, and nature of VCPRs are laid out in multiple industry resource documents, including the AVMA [37] and the NPB Pork Quality Assurance (PQA) Plus® program [38]. Additionally, having a valid VCPR, verified by reviewing dated written material such as veterinary feed directives, prescription labels, or a veterinarian letter confirming the relationship, is an audit criterion within the Common Swine Industry Audit (CSIA) [39]. National swine industry data indicated that 98.2% of participating swine operations acknowledged having a VCPR [40]. In the current study, although the majority, only 80% of veterinarians noted having a VCPR with the facilities they currently work with. The remaining respondents either did not have one or declined to answer. Although the sample size in this study was small, it is worth noting this result as a VCPR is foundational to providing veterinary services.

Veterinarians have differing relationships with the facilities for which they provide services. Within the swine industry, private practice veterinarians commonly serve swine operations, compared to, for instance, the poultry industry, which relies more upon company-employed veterinarians [41]. Although reported in the context of antimicrobial use and stewardship, the 2017 National Animal Health Monitoring System (NAHMS) report indicated that, of the participating swine operations, only 15.4% of sites were visited by an on-staff or company veterinarian in the preceding months, compared with 55.8% being visited by a local veterinary practitioner or a consulting or second-opinion veterinarian [40]. Most respondents in the current study either worked with multiple companies with several site locations or one company with several site locations. The type of relationship between a veterinarian and the swine operation may somewhat determine the balance between primary animal care responsibilities (such as performing euthanasia) and other more specialized veterinary tasks (such as development of treatment and euthanasia protocols), and generally food animal veterinarians are not present on-farm frequently enough to perform tasks such as euthanasia [36]. In the current study, the majority of the respondents were not the individuals making euthanasia decisions or performing euthanasia but were sometimes consulted on a few cases. Wagner et al. [23] reported similar findings with dairy veterinarians; 68.9% of study participants indicated that someone other than themselves performed the majority of euthanasias on the dairy operations where they served as veterinarians. A study focusing on dairy producer perspectives on euthanasia reported that approximately a third of participants indicated consulting a veterinarian on euthanasia decisions, substantially more than was reported in the current study [2].

Even though veterinarians did not make day-to-day decisions on euthanasia in this study, the majority (72%) did participate in the development of the written protocol for euthanasia on-farm, and most of the farms the respondents worked with had protocols. Having written procedures for euthanasia is critical, particularly because the impacts of performing euthanasia incorrectly can have significant consequences for human and animal welfare [22, 42]. Despite the significance of this task, in addition to the fact that having a written euthanasia protocol is a requirement in the CSIA [39] and is outlined in the PQA Plus® program [38], there are still swine operations that do not have written protocols for euthanasia. Lack of written euthanasia protocols has also been identified in the dairy industry; Wagner et al. [23] reported greater than 40% of their study participants indicated that most of the facilities respondents served did not have a written protocol for euthanasia. Although a need, the mere existence of the protocol is not enough; the protocol must also be accessible to the caretakers that it is relevant to, both by being visually present at the operation and also provided in the native language of those performing the job [23]. In the current study, the majority of respondents did indicate that training materials were available on-farm for review when needed.

The swine industry has many resource documents related to proper techniques for performing euthanasia, including information in the PQA Plus® program [38], the NPB and AASV on-farm euthanasia recommendations [4], and euthanasia guidelines set forth by the AVMA [3]. When asked what resources the survey respondents used to determine method of euthanasia, many of these aforementioned organizations and materials were identified, indicating that these resources are likely readily available to veterinarians. Past studies exploring caretaker and veterinary perspectives regarding euthanasia in various livestock industries have all identified the importance of euthanasia training [2, 22–23, 27]. Training, in general, is important to employee success [43] and positive interactions on-farm between animals and the caretakers, particularly when talking about a challenging task such as euthanasia, and can truly impact caretakers' job satisfaction [44]. Despite this recognition and the availability of materials, there are still opportunities for training within the swine industry. In the current study, only half of the respondents felt that caretakers were adequately trained on euthanasia, despite the fact that the majority indicated that on the farms they worked with there was a written euthanasia protocol and training materials were available on-farm for review. Similarly, McGee et al. [45] also

reported that half of participating swine caretakers had received euthanasia training in the past year. McGee et al. [45] indicated that almost a third of their survey participants would like more training; this has been similarly shared by dairy workers who indicated a general desire for more in-person, on-the-job training [46]. For a task that has critical impacts on both human and animal welfare, training is certainly an area of needed attention.

Training on production facilities can come in many different forms, such as presentations with multimedia (i.e., slides and videos), review of protocols and resource documents, or in-person demonstrations and hands-on experience [43]. In the current study, the majority of respondents indicated that they perform some type of in-person training on the farms with which they work. In line with the findings of Wagner et al. [23], indicating that dairy cattle veterinarians would like more opportunities for interactive euthanasia training with caretakers, the vast majority of the respondents in the current study wanted to be more involved with euthanasia training on-farm. McGee et al. [45] indicated that swine caretakers preferred on-farm euthanasia training with classroom follow up, including written materials and video. Campler et al. [47] have explored the use of an interactive, computer-based euthanasia training program for swine caretakers and identified a self-reported improvement in knowledge post-training. There is a clear opportunity across livestock industries to further engage veterinarians in preparing caretakers for both decision-making and performance of this critical management task using multimodal delivery methods.

Discussions about euthanasia training usually revolve around the animal caretakers as they are the individuals more commonly performing the task. In the current survey, respondents were asked to comment on their own euthanasia training and the shared message was that although the majority felt they had the experience and knowledge to perform the task, they did not necessarily receive enough euthanasia training in veterinary school or through continuing education. A 2011 survey, including 21 AVMA-accredited veterinary medical colleges in the United States, Canada, and the Caribbean, found that only 10% of schools offered euthanasia and quality-of-life content and training [48]. Euthanasia training was generally included as a core topic, rather than elective credits, but students at the participating institutions only received an average of 4.4 h of training on this topic while in veterinary school [48]. One study suggested that veterinary schools might only be able to provide 15 h of euthanasia and end-of-life training maximum due to the already dense nature of the curriculum [49]. Dickinson et al. [49] proposed increased support of continuing education and symposiums by veterinary schools to channel current and graduated veterinary students towards needed euthanasia education. The only euthanasia training veterinary students might obtain is from their clinical rotations, should cases requiring consideration of euthanasia occur; additionally, it is not known how much livestock-specific training is available. Veterinary-specific euthanasia training, pre- and post-veterinary school, is an area in need of further development.

Interestingly, despite the strong message across studies that euthanasia training is needed on livestock production facilities [2, 29, 43, 47], in all the recommendations there is rarely a direct suggestion that the euthanasia training should include mental health awareness. As has been mentioned, even if individuals appreciate the importance of euthanasia as a tool to alleviate animal suffering, which most do, actually performing the job can be stressful. In the current study, the majority of respondents indicated that human safety components were included in training, as they should be, but fewer indicated that strategies for coping with personal stress and emotional wellness were part of on-farm training. In this study, only half of the respondents indicated awareness of mental health resources within their communities. Half also indicated that there were programs to promote worker health at the facilities with which they worked but only a third of the facilities actually had employee check-ins. This survey did not provide a specific definition of these items but the intent was to gain a preliminary understanding of existing resources and avenues of communication that may be capitalized upon to help alleviate

some of the stress associated with euthanasia. One interesting comment in one of the open-ended questions was the concern about new caretakers' initial negative reactions to the euthanasia process. Reeve et al. [7] found that "turning point" events can significantly impact individuals' future feelings towards euthanasia and cited the first euthanasia experience as one of these potential turning point events. It is important to provide individuals with the technical skills and confidence to perform euthanasia but also the understanding of why euthanasia is important and how to cope with the associated stress. The availability of simple resources, support, and stress management tools are highly beneficial to those who participate in both performing and making euthanasia decisions. Some examples of effective resources to address the mental stress of euthanasia utilized in animal shelters include counseling resources, job rotation, assistance with job performance, breaks, support groups and meetings, open communication, training, and morale-boosting initiatives [14]. Future work should explore what type of strategies can be implemented on swine operations around the topic of euthanasia to promote caretaker and veterinarian mental well-being.

Summary of Results:

- Although the euthanasia training on the worker respondents' respective farms was thought to be adequate, there is a desire for further training on this topic.
- The incorporation of strategies to cope with the mental stress of performing euthanasia should be included in on-farm euthanasia training.
- It appears that there is already a foundation for health programming in swine operations but there should be an emphasis on both the physical and mental aspects of employee health as it relates to euthanasia.
- Veterinarians should provide guidance on protocols, decision trees, and training.
- Protocols for euthanasia should be understood and accessible to all caretakers.
- Efforts should be focused on providing more training opportunities for both veterinarians and animal caretakers.
- Strategies to deal with the mental well-being impacts of performing euthanasia should be included into training and other management frameworks to provide support for those who make decisions about and perform euthanasia as part of their job.

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