Caretaker attitudes toward swine euthanasia[1]

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ABSTRACT: Timely euthanasia is a fundamental part of safeguarding swine welfare by reducing suffering when compromised pigs are unable to recover. The quality and appropriateness of timely euthanasia rely mainly on the knowledge and experience of the individual caretaker but may also be affected by caretaker attitudes toward euthanasia. However, literature on caretaker attitudes toward swine euthanasia is lacking. This study investigated caretaker attitudes, perceived knowledge, and confidence in performing on-farm timely euthanasia. A total of 84 caretakers from eight swine farms (ranging in size from 1,300 to 7,000 sows) participated in a survey designed to investigate attitudes toward swine and swine euthanasia. Caretaker's ages ranged from 18 to 59 yr with an average work experience of 8.5 yr. The majority of participants worked in either farrowing or breeding units. Survey questions were designed to assess caretakers' attitudes and attributes (empathy affect, empathy attribution, attitudes toward pigs, feeling bad about euthanizing pigs, and assumptions about pigs' emotional capabilities), decision-making skills (confidence in identifying compromised pigs or relying on coworkers to make decisions), and euthanasia skillset (confidence in performing euthanasia, training, and perceived level of knowledge). Using cluster analysis to analyze survey answers, three distinct groups of caretakers were identified: 1) confident and empathetic; 2) Confident, knowledgeable, and detached; and 3) unconfident and lacking knowledge. The survey results showed that empathy attribution was strongly correlated with empathy affect ($r = 0.571$, $P < 0.01$) and that empathy affect and empathy attribution were higher in female caretakers compared with male caretakers ($P < 0.05$). A risk analysis that included previously identified clusters showed that females were more likely to be grouped among caretakers that were confident and empathetic ($P = 0.04$), and caretakers with more than 2 yr of swine experience were more likely to be grouped as confident and skilled ($P = 0.01$), while the unconfident and empathetic were more likely to have had less than 2 yr of experience ($P = 0.04$). This study provides important information about variability in caretaker experience as well as their attitudes toward pigs and timely euthanasia. Increased knowledge about swine caretaker attitudes may be used to implement training and euthanasia protocols to increase both human and pig welfare on farm.

Key words: attitudes, caretaker, swine, timely euthanasia, welfare

INTRODUCTION

Timely euthanasia is of great concern to the general public and within the U.S. swine industry. The American Veterinary Medical Association (**AVMA**) states that swine that are sick or injured and fail to recover should be euthanized in a humane and reliable manner (AVMA, 2013). Although national guidelines and training materials for timely euthanasia have been developed (e.g., On-Farm Euthanasia of Swine—Pork Checkoff (NPB, 2008), Common Swine Industry Audit (**CSIA**; NPB, 2017), On-Farm Swine Euthanasia Training Program—The Ohio State University (Mullins et al., 2018)), a recent survey by McGee et al. (2016) reported that only half of caretakers had any euthanasia training at all. Unsurprisingly, the quality and appropriateness of performing euthanasia often depend upon personal experience and decision-making skills of the individual caretaker (Turner and Doonan, 2010; Gemus-Benjamin et al., 2015). Moreover, caretakers' attitude toward animals (Coleman et al., 1998; Coleman and Hemsworth, 2014) may influence their willingness to perform euthanasia and impact the quality, consistency, and reliability on how euthanasia is performed (Ajzen, 1991; Hemsworth et al., 1994). Matthis (2004) found that 87.0% of the survey participants understood the important welfare aspects of performing swine euthanasia, but 46.4% of the same participants would be happy not to have to perform euthanasia again. A more recent study conducted by Rault et al. (2017) reported that the euthanasia process itself could adversely affect caretakers and that lack of training or knowledge regarding euthanasia was moderately correlated with poor decision-making and euthanasia avoidance.

With limited additional caretaker attitude studies conducted in the United States since Matthis (2004), this study aims to assess how swine caretaker characteristics and attitudes toward timely euthanasia are related to caretaker training and experience.

MATERIALS AND METHODS

This study was reviewed and approved by The Ohio State University Institutional Review Board (IRB:2017E0106) for Human Subjects Research.

Survey

A total of 84 caretakers (100% response rate) from eight different farms with mixed production stages/classes of pigs participated in the study. This was part of a larger training study in which participants completed a multimedia euthanasia training program (Mullins et al., 2018). Prior to participating in the training program, participants signed a consent form authorizing the use of their anonymous answers and demographic information and completed a 45-question survey validated in a previous study (Rault et al., 2017) and divided into three different sections (Supplementary Appendix 1). The first section consisted of 10 questions including demographic information such as age, sex, number of years working with pigs, and prior experience working with livestock other than pigs. For the remaining section of the survey, responses were given on a 5-point scale, from 1) strongly disagree, 2) disagree, 3) neither agree or disagree, 4) agree to 5) strongly agree. The second section consisted of seven statements related to personal knowledge and skillsets regarding identification, evaluation, and decision-making of compromised pigs and included statements such as "I have enough time during my shift to identify sick and compromised pigs." The third part of the survey and main focus of this paper had 28 statements related to attitudes, management, and general confidence when working with pigs and included statements such as "I feel confident that I know when a pig needs to be euthanized." The last set of questions within the third part of the survey assessed the caretaker empathy in statements such as "If I see a pig injure itself I know how it feels." These statements were previously identified to be strongly linked to empathy toward pigs (Rault et al., 2017). To assure that statements were read properly, 10 statements were reworded to contain a negation, so the response scale was reversed. The scale for these particular questions was later reversed for analyses with the higher score corresponding to a higher agreement.

STATISTICAL ANALYSIS

Spearman rank correlation analyses were conducted in SPSS 25.0 (IBM Corp. IBM SPSS Statistics

for Windows, Version 25.0. IBM Corp., Armonk, NY); cluster-, univariate-, and multivariable analyses were conducted using STATA/IC 14.1 (StataCorp LP, College Station, TX). Data were initially checked for identification of recording errors and missing data. Questions that were left blank by the participants were considered missing and excluded from analyses on corresponding parameters.

Basic descriptive analyses were conducted including correlation analysis, descriptive plots, and basic statistics (mean, SD, range), followed by multivariate analysis in the form of cluster analysis and risk factor analysis. After assessing data normality (QQ-plots and Shapiro–Wilk test), the survey data were determined as not normally distributed ($P > 0.05$), and therefore, the Spearman's rank correlations coefficient was used. For the correlation analysis, the responses from seven questions related to empathy toward pigs were averaged into one variable called "empathy attribution," while the responses from five questions related to the evoked feelings in the caretaker were averaged into one variable called "empathy affect" for further analysis.

Cluster analysis was used as an exploratory tool for grouping study participants into groups that were similar in regards to their responses in section 3 of the survey. The complete-linkage cluster method was used with a continuous dissimilarity measure and based on L2 or Euclidean distance. The set of questions offered to cluster analysis included the 28 questions from section 3 of the survey, which included all attitude-related questions. Cluster analyses identified four clusters; however, one of the clusters was composed of one participant; therefore, this cluster was not used for further risk factor analysis.

Three separate multivariable mixed-effects logistic regression models were created using each one of the identified clusters as the outcome in order to investigate the effect of the predictors' farm size, pig experience, sex, production stage, and age, on the odds of participants to be part of each cluster separately. Due to the clustering of participants within swine farms, farm was included as a random effect for all models. Model-building steps included first checking for linearity between continuous variables and the log odds of the outcome. Since this assumption was not met, variables were categorized as follows: age was divided into two categories (1: <30 yr of age [$n = 48$] and 2: >30 yr of age [$n = 34$]); pig experience was divided into two categories (1: <2 yr of experience [$n = 34$] and 2: >2 yr of experience [$n = 46$]); and farm size (pigs per farm) was divided up into three categories; (small:

<1,500 [$n = 3$], medium: 1,501–3,000 [$n = 3$], and large: >3,000 [$n = 2$]). Secondly, univariate mixed models were built and a conservative P value of <0.2 was used for screening variables that moved into the full final model. Finally, multivariable mixed models were built using a backward stepwise approach, and final statistical significance was declared at $P < 0.05$. Lastly, BLUP were estimated and checked for normality (Dohoo et al., 2010).

RESULTS

Descriptive Analysis

The average age of participants was 33 yr (18–59 yr old), with 55% being younger than 30 yr of age and 45% being older than 30 yr of age; 86.4% participants identified as male and 13.6% as female. Only 2.4% of the participants grew up in a capital city (defined as a densely populated urban area in the region), while 52.4% grew up in country towns (defined as a small town in a predominately rural area), and 45.2% grew up on farms (defined as growing up on a family farm with no adjacent urban or suburban areas). About half (46.3%) of the participants reported having had previous experience working with livestock species other than pigs and half (52.4%) did not. The average work experience with pigs was 8.5 yr (median = 2.25; range = 2 wk–52 yr) with 50% having less than 2 yr of work experience and 50% having more than 2 yr of work experience. The average farm size which survey participants worked on was 3,100 pigs with a range between 1,300- and 7,000-head barns. In regards to role on farm, a minority of the participants identified themselves as farm owners that worked with pigs often (8.5%), a manager who worked with pigs occasionally (3.7%) or as a caretaker that worked with pigs occasionally (3.7%), while the majority of participants identified themselves as caretakers that worked with pigs often (59.7%) or managers that worked with pigs often (24.4%). Seventy-five percent of the participants worked either in farrowing (41.5%) or breeding units (32.9%), while 14.6% worked with a combination of different production stages (farrow to finish; farrow to nursery). A minority of the participants worked in either weaner/nursery (4.9%) or grower/finisher (4.9%), and one participant did not answer the question (1.2%). The number of participants that cared for less than 100 pigs on a daily basis were few (8.5%), while 23.2% of participants cared for 100–500 pigs, 6.1% cared for 500–1,000 pigs, 22.0% cared for 1,000–2,500 pigs, and

37.8% cared for over 2,500 pigs, and two participants did not answer (2.4%). Approximately one-third of the participants (33.3%) had previous experience with euthanasia before starting to work with pigs, while 50% of the participants had their first euthanasia experience when they started working with pigs, and 16.7% of the participants had not euthanized any animal to date. Among the caretakers that did not have any euthanasia experience, three caretakers had 3, 5, and 10 yr of experience working with pigs respectively, while the remaining caretakers were new hires averaging 5 wk on the job.

Correlation Analysis

The Spearman rank correlation analysis between the survey questions and demographics revealed six distinct correlations (Table 1). Questions related to empathy affect were weakly correlated with sex ($r = 0.228$, $P < 0.05$), with females tending to score higher on empathy affect questions compared with males ($F_{1,79} = 2.86$, $P = 0.095$). Empathy attribution questions were strongly correlated with empathy affect ($r = 0.571$, $P < 0.01$) and weakly correlated with sex ($r = 0.235$, $P < 0.05$) with females tending to score higher on empathy attribution questions compared with males ($F_{1,79} = 3.02$, $P = 0.086$). Additionally, a strong positive correlation between swine experience and caretaker age was observed ($r = 0.548$, $P < 0.01$). A moderately strong positive correlation between previous livestock experience and prior euthanasia experience was observed ($r = 0.397$, $P < 0.01$) where caretakers who had previously worked with other types of livestock were more likely of having previous euthanasia experience compared with caretakers who did not have other livestock experience ($F_{1,78} = 8.06$, $P < 0.001$). Finally,

a weak negative correlation between previous livestock experience and the number of pigs the caretaker cared for was observed ($r = -0.247$, $P < 0.05$).

Cluster Analysis

Cluster 1 (confident and empathetic). Cluster 1 consisted of 24 participants (34.8% of total) who mainly worked in the farrowing units on small farms. In brief, participants were grouped into this cluster if they were considered as having high confidence in knowing what was wrong with pigs on an initial inspection and how likely it was for a sick pig to improve and if they reported feeling confident enough to know if and when a pig needed to be euthanized based on its condition. Moreover, participants grouped within this cluster felt knowledgeable enough to be able to diagnose a sick pig, make decisions regarding sick or compromised pigs and were likely to try to save all pigs if possible. These participants were also the least likely to disagree with coworkers regarding making a euthanasia decision. They also reported feeling comfortable performing euthanasia and tried not to think about pigs' feelings at the time of euthanasia. However, cluster 1 participants agreed with the statement that "euthanasia is the right thing to do to stop suffering but I feel bad about doing it." Additionally, these participants were likely to agree with statements regarding the pigs' ability to have similar feelings as humans and in trying to understand how pigs feel by imagining how things look from pigs' point of view. Moreover, they were the most likely to agree to being better than most people at imagining how a pig feels and to be more upset than most people when seeing an "unhappy" pig. Finally, cluster 1 participants were the most likely to feel good about seeing a "happy" and 'contented' pig (Table 2).

Table 1. Nonparametric Pearson correlations between variables extracted from the survey

	Empathy affect	Farm size	Staff age	Sex	Swine experience (years on farm)	Previous livestock experience	First euthanasia experience	Pig care (responsibility, #pigs cared for)	Empathy attribution
Empathy affect	1	−0.104	−0.032	**0.228***	0.084	−0.068	−0.055	0.111	**0.571****
Farm size	−0.104	1	−0.092	−0.076	−0.013	0.058	0.133	0.007	0.018
Staff age	−0.032	−0.092	1	0.037	**0.548****	−0.154	−0.121	−0.033	−0.163
Sex	**0.228***	−0.076	0.037	1	0.134	−0.129	−0.046	−0.142	**0.235***
Swine experience (years)	0.084	−0.013	**0.548****	0.134	1	−0.074	−0.199	0.127	−0.123
Previous livestock experience	−0.068	0.058	−0.154	−0.129	−0.074	1	**0.397****	**−0.247***	0.073
Prior euthanasia experience	−0.055	0.133	−0.121	−0.046	−0.199	0.397**	1	−0.157	0.1
Pig care (responsibility, # pigs)	0.111	0.007	−0.033	−0.142	0.127	−0.247*	−0.157	1	0.038
Empathy attribution	**0.571****	0.018	−0.163	**0.235***	−0.123	0.073	0.1	0.038	1

**Correlation is significant at the 0.01 level (two tailed).

*Correlation is significant at the 0.05 level (two tailed).

Table 2. Cluster agreement to survey statement (mean + SD) on a 5-point scale (1= strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, and 5 = strongly agree) enhanced by a light (disagreement) to dark (agreement) greyscale gradient

Survey question	Cluster1		Cluster 2		Cluster3	
	Mean	SD	Mean	SD	Mean	SD
When I see a sick pig I usually know what is wrong with it	3.58	0.78	3.58	0.62	2.43	0.85
When I see a sick pig I usually know if it will get better	3.79	0.72	3.52	0.77	2.57	0.85
I feel confident that I know when a pig needs to be euthanized	4.42	0.50	4.39	0.56	3.21	1.05
I don´t have enough knowledge and/or experience to diagnose what is wrong with sick pigs	2.29	0.91	1.94	0.89	3.57	1.09
I don't have enough knowledge and/or experience to know if a pig needs to be euthanized	2.08	0.88	1.58	0.56	3.07	0.92
I don´t have enough knowledge and/or experience to know what to do with sick or compromised pigs	1.83	0.76	1.55	0.57	3.14	0.95
It is difficult to decide when a diseased pig should be euthanized	2.13	0.85	1.97	0.66	3.14	0.77
I tend to wait longer than I should before euthanizing a pig	1.67	0.82	2.06	0.73	2.50	0.76
I often disagree when a co-worker says a pig needs to be euthanized	1.88	0.74	2.32	0.79	2.14	0.95
I often feel that there are good reasons for not euthanizing a pig	2.67	1.01	2.71	0.78	3.21	0.97
I am less likely to euthanize a sow that is close to farrowing than other sows	3.08	1.10	3.10	0.79	3.00	0.68
I try to save all pigs	4.42	0.65	3.65	1.25	3.86	1.17
If I had the choice, I would prefer someone else to euthanize pigs rather than myself	2.29	0.95	2.52	1.06	3.07	1.21
I am more likely to euthanize a pig now than 5 years ago	3.54	1.35	3.35	1.31	3.00	1.18
I feel comfortable doing euthanasia	4.08	1.06	4.48	0.72	2.71	1.20
I dislike euthanizing pigs	2.88	1.12	3.00	1.06	3.43	1.09
I try not to think about the pig´s feelings when I euthanize it	3.42	1.28	3.13	0.85	2.86	1.10
I know that euthanasia is the right thing to do to stop suffering but I feel bad about doing it	4.13	0.90	3.10	1.33	3.57	1.02
Pigs are generally able to feel sadness	3.79	0.88	3.32	0.65	3.57	0.65
Pigs have feelings like people have feelings	3.88	0.80	2.87	0.99	3.57	0.76
I think of pigs as generally able to feel happiness	4.17	0.64	3.45	0.62	3.29	0.73
Seeing a neglected animal doesn´t affect me as much as it would affect some people	2.13	1.23	2.45	1.18	2.50	0.94
When I see pigs having fun I feel really happy	4.38	0.58	3.74	0.73	3.71	0.73
If I see a pig injure itself I know how it feels	3.88	0.90	3.26	0.68	3.21	0.80
I try to understand pigs by imagining how things look from their point of view	4.13	0.74	3.23	0.88	2.86	1.10
Imagining how a pig feels is something I do often	3.92	0.78	2.77	0.80	2.71	0.73
When I see an unhappy pig it upsets me more than it would upset most people	3.75	0.94	2.65	0.75	2.79	0.80
I am better at telling if a pig s happy than most other people	3.33	0.76	2.90	0.79	2.64	0.74
Seeing a contented pig makes me feel really good	4.33	0.48	3.42	0.96	3.29	0.47
Empathy attribution questions (compounded)	3.96	0.97	3.14	0.86	3.03	0.83
Empathy affect questions (compounded)	3.81	0.80	3.19	0.74	3.32	0.77

Cluster 2 (confident, knowledgeable, and detached). Cluster 2 consisted of 31 participants (45.0% of total) who mainly worked in breeding or weaner/finisher units on medium-sized farms. These participants agreed to a high extent with statements about having sufficient knowledge and experience regarding identifying what is wrong with a sick or injured pig, how likely it was for a pig to improve, and if a pig needed to be euthanized. Cluster 2 participants were likely to agree with a coworker regarding euthanasia decisions and felt knowledgeable and comfortable in regards to when to euthanize a pig compared with the less knowledgeable cluster 3. Participants grouped into cluster 2 also disagreed to the statement regarding the attempt to save all pigs and agreed to the statement regarding feeling bad about performing euthanasia. Cluster 2 participants agreed on statements regarding the pigs' abilities to feel "sadness" and "happiness" but disagreed on the statement that pigs were able to have feelings similar to humans (Table 2).

Cluster 3 (unconfident and lacking knowledge). Cluster 3 consisted of 14 participants (20.0% of total) that predominantly worked in one or more production stages on medium- or large-sized farms. Cluster 3 participants appeared to be moderately confident in identifying sick or injured pigs and

knowing the chances of improvement for a pig or need for euthanasia. They also were characterized by reporting the least experience with sick or injured pigs, not feeling confident in how to handle sick or injured pigs and agreed that they lacked knowledge in how to diagnose sick pigs. Participants from cluster 3 also identified themselves as having a hard time making decisions on when to euthanize a pig, waited longer to euthanize compromised pigs, felt the least confident performing euthanasia, and were more likely to prefer that someone else euthanized the pigs compared with clusters 1 and 2. Additionally, cluster 3 participants agreed on feeling good when they see "happy" pigs; however, they were uncertain on whether they could identify different affective states in pigs. Finally, cluster 3 participants disagreed on feeling content when seeing a "contented" pig but were the intermediate cluster in agreeing to the statement that pigs have the ability to have feelings comparable with humans (Table 2).

Risk Factor Analysis

The final model for cluster 1 included production type, sex, and age; the final model for cluster 2 included work experience; and the final model for cluster 3 included farm size and work experience (Table 3). Female survey participants tended to be more likely to be grouped in the confident and empathetic cluster (odds ratio [OR] = 4.44, P = 0.079; Cluster 1; Table 3). Participants who had more than 2 yr of swine experience were likely to be grouped in the confident, knowledgeable, and detached cluster (OR = 3.76, P = 0.011; Cluster 2; Table 3) and less likely to be grouped into the cluster that was unconfident and lacking knowledge (OR = 0.22, P = 0.042; Cluster 3; Table 3).

DISCUSSION

Correlation

Empathy attribute–related questions positively correlated with sex, in that female caretakers were more likely to empathize with pigs compared with male caretakers, which is in agreement with Matthis (2004) who demonstrated that female caretakers were more sensitive to the perceived pain experience of pigs and a previous study in veal that reported that female caretakers showed more positive behavior toward veal calves compared with male caretakers (Lensink et al., 2000). Moreover, female caretakers in the present survey had a more negative attitude toward euthanasia overall compared with male caretakers, which is in agreement with findings by Matthis (2004) and Rault et al. (2017). Animal-directed empathy has been suggested to be linked to human-directed empathy (Ascione, 2001), which potentially could explain the female response seen in all three surveys given that females demonstrate an enhanced ability to recognize nonverbal emotional displays in humans (Thompson and Voyer, 2014).

Table 3. Final risk analysis models including age, sex, farm size, work experience, and production type for Cluster 1–3

Variable	Category	OR	SE	95% CI	P
Cluster 1					
Production type	Farrowing	Ref			
	Breeding	0.56	0.36	(0.16, 1.98)	0.365
	Weaner/finisher	0.38	0.31	(0.08, 1.88)	0.237
Sex	M	Ref			
	F	4.44	3.76	(0.84, 23.4)	*0.079*
Age	<30	Ref			
	>30	0.39	0.26	(0.11, 1.41)	0.152
Cluster 2					
Work experience (years)	<2	Ref			
	>2	3.76	1.95	(1.36, 10.4)	*0.011*
Cluster 3					
Farm size	Small	Ref			
	Medium	3.26	3.84	(0.32, 32.8)	0.315
	Large	5.32	6.08	(0.56, 50.0)	0.144
Work experience (years)	<2	Ref			
	>2	0.22	0.16	(0.02, 1.04)	*0.042*

Empathy affect was also positively correlated with empathy attribute, indicating that caretakers who were more likely to show empathy toward pigs also perceived the euthanasia procedure more negatively compared with other caretakers. Euthanizing animals that have been under the direct care of those performing euthanasia can influence the caretakers' willingness to euthanize and is known more commonly across species as the "caring–killing paradox" (Arluke, 1994; Scotney et al., 2015). The caring–killing paradox stems from the conflict a caretaker experiences when frequently having to shift between caring for animals and euthanizing animals, something often seen in shelters where unwanted but healthy animals often have to be euthanized. Rollin (1987) argued that caretakers are subjected to a "moral stressor" caused by the innate will of helping and protecting the animals they have to euthanize. Therefore, the stress associated with performing euthanasia and the perception that euthanasia is considered a "failure" can also result in "compassion fatigue" (defined by Joinson, 1992; as "a unique form of burnout that affects people in caregiving professions"). Compassion fatigue is most documented in shelter (Frommer and Arluke, 1999) or research settings (Herzog, 2002) and results in it becoming more difficult for a caretaker to make proper euthanasia decisions. Although this line of questioning was not asked directly in this survey, attitudes may reflect the quality of individual swine care (Coleman et al., 1998). It has been suggested that precautionary actions such as job rotation, time off, and additional employees may help to mitigate compassion fatigue, which could help caretakers to make proper euthanasia decisions and therefore reduce animal welfare issues regarding timely euthanasia (Rogelberg et al., 2007; Baran et al., 2009).

Cluster and Risk Factor Analysis

Cluster analyses showed that survey participants grouped in the confident and empathetic cluster or in the confident, knowledgeable, and detached cluster felt more confident and knowledgeable regarding identifying sick or compromised pigs compared with the unconfident and knowledge-lacking cluster. In addition, caretakers in the confident and empathetic or in the confident, knowledgeable, and detached cluster also felt more comfortable in their ability to perform euthanasia as compared with the unconfident and knowledge-lacking cluster. These observations are reasonable as increased time working with pigs will expose the caretaker to a multitude of scenarios, which will yield more experience in identifying and euthanizing compromised pigs. Adequate training and exposure to compromised pigs are important to be able to appropriately make a sound decision regarding treatment or euthanasia. Another important aspect about caretaker training is that not only does the caretaker need to be able to make an appropriate assessment of the situation but also be able to perform timely euthanasia. Compared with the confident and empathetic or the confident, knowledgeable, and detached cluster, caretakers in the unconfident and knowledge-lacking cluster did not only feel inexperienced and untrained but was also more likely to have someone else perform euthanasia if given the choice.

Another similarity between the confident and empathetic and the confident, knowledgeable, and detached clusters is that caretakers in both groups worked on either small- or medium-sized farms. The cluster analysis for this survey suggests that caretakers from small- or medium-sized farms may have better knowledge and experience overall on what to do regarding sick or injured sows compared with the caretakers who were working on larger farms. It is possible that working on a smaller farm creates a smaller workload or that a lower number of animals to care for per caretaker may help to create a working situation where caretakers are enabled to receive more training by more experienced caretakers (English, 1991; Lensink et al., 2000; Seabrook, 2001). However, with a limited sample size of eight farms, this finding has to be interpreted cautiously. Finally and importantly, we did not find any evidence that caretakers who worked on larger farms held more negative attitudes toward pigs compared with small farms indicating that any work-related frustration based on workload was not directed toward the pigs.

Risk factor analyses showed that time spent working on a swine farm was significantly associated with cluster membership. Caretakers with less than 2 yr of swine experience were significantly more likely to be grouped in the unconfident and knowledge-lacking cluster, whereas caretakers with more than 2 yr of swine experience were significantly more likely to be grouped in the confident, knowledgeable, and detached cluster, while the confident and empathetic cluster contained a mix of experienced and inexperienced caretakers.

Interestingly, the risk analysis also showed that females had four times the odds for being grouped in the confident and empathetic cluster compared with males. Overall, females tended to be more negative toward euthanasia and agreed to a higher extent to empathy affect and attribution-related questions, agreeing more to statements regarding pigs' ability

to express emotions such as happiness, sadness, and pain. The cluster that was most neutral regarding empathy-related questions was the unconfident and knowledge-lacking cluster, which contained no female caretakers. It is possible that, as previously discussed, female caretakers in our study were more prone to empathize with pigs compared with male caretakers. However, it is important to note that female caretakers in our study only accounted for 13.6% of the survey participants and that all female caretakers were working on either small or medium farms.

LIMITATIONS

We acknowledge that the 84 participants in this survey represent a very small fraction of the industry workforce, but our intent with this study was not to map out all differences between caretakers within the swine industry but rather to create an updated snapshot of swine caretaker attitudes toward euthanasia based on standard demographic information. This survey confirms the wide range of experience levels, ages, and confidence levels regarding euthanasia among caretakers across eight swine-producing facilities.

CONCLUSION

These survey results reveal important information about caretaker experience, training, knowledge, and skill-level based on self-assessments in regards to attitudes toward swine euthanasia. Experienced appears to play a crucial role influencing caretakers' attitudes toward swine euthanasia, but empathy and confidence were also important. Information about swine caretakers' attitudes toward euthanasia is valuable to the swine industry stakeholders as it provides a starting platform from where to investigate the relationship between caretaker attitudes and possible quantification of euthanasia quality and appropriate timing based on a swine welfare perspective.

SUPPLEMENTARY DATA

Supplementary data are available at *Animal Frontiers* online.
Conflict of interest statement: None declared.

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