Gender and job characteristics of slaughter industry personnel influence their attitudes to animal welfare

Animal Welfare attitudes of the slaughter industry

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Abstract

The aim of this study was to gain an understanding of the attitudes that those involved in the slaughter industry have towards animal welfare and animal welfare aspects of their work, and also to investigate if gender or characteristics of employment (e.g. previous training, role and experience) influence such views. A paper questionnaire consisting of 20 Likert items regarding either animal welfare or working in the slaughter industry and seven questions designed to gather information on participant gender and job characteristics was distributed to attendees at 11 Animal Welfare Officer (AWO) and Poultry Welfare Officer (PWO) courses run by the University of Bristol. Responses were received from 215 personnel involved in the slaughter industry. It was found that the views of the majority of the respondents towards animal welfare were positive. Being female, working routinely with mammals, having a longer period of time working in the industry, and having previous AWO/PWO training course experience were all associated with significantly more positive attitudes towards animals and working in the slaughter industry; while working with birds, and working in an enforcement or stockperson role had a significant negative influence on the response to some animal welfare and employment related statements . Although it should be considered that individuals attending an animal welfare course may already have an interest in animal welfare, the results suggest that gender, and employment factors do influence attitudes to animal welfare in the slaughter industry, and that the origins and reasons for development of certain negative views warrant further investigation.

Keywords: Animal welfare, attitudes, gender, questionnaire, slaughter industry,

Introduction

Many billions of animals are slaughtered in EU slaughterhouses every year (Eurostat 2019). In order to process increasing numbers of animals, modern abattoirs have undergone significant technical advancement and automation (Fitzgerald 2010). However, abattoirs are still highly reliant on stockpersons for the handling and movement of animals from arrival to the point of slaughter. It has been reported that the attitude of stockpeople working in abattoirs can influence their behaviour towards livestock, therefore potentially impacting on welfare (Coleman et al 2003; Coleman et al

2012; Hultgren et al 2014) and by extension, be influential with regard to product quality and economic return (Gallo & Huertas 2016; Huertas et al 2015).

The Theory of Reasoned Action (Fishbein & Ajzen 1975) was developed to help understand factors that motivate human behaviour under volitional control. According to the theory, it is a person's intention to perform a particular behaviour, which is the primary cause of such behaviour. In turn, intention to perform a behaviour is determined by an individual's attitude, as well as subjective norms (whether people would approve of their behaviour and what is expected of this individual) which underlie that behaviour (Ajzen 1991). In the slaughterhouse situation, it is likely that 'subjective norms' are dictated, somewhat, by what is expected, and permitted, by management. The Theory of Planned Behaviour is an extension of the Theory of Reasoned Action (Ajzen 1985) which attempts to explain behaviour that is not under complete volitional control, for example, many behaviours performed by slaughterhouse personnel are conducted in accordance with 'standard operating procedures' rather than through individual choice. The Theory of Reasoned Action, refers to an individual's perception about how easily a specific behaviour can be carried out, and it is implied that this includes previous experience and perceived obstacles. This has provided a basis for predicting behaviour based on an individual's attitude, as the individual's motive for performing a behaviour will likely be stronger given a more favourable subjective norm and attitude (Coleman 2004).

Although generic attitude-behavioural models, such as the Theory of Planned Behaviour, can be applied across all livestock sectors, there are specific issues that are relevant to individual species and to the contexts in which they are farmed (and slaughtered). Studies have been carried out in Australia which directly compare the attitudes of stockpeople working in slaughterhouses, and their observed behaviours towards animals which are handled by them in the lairage. Coleman et al (2003) investigated the relationship between attitudes towards pigs and the use of electric prods (goads). High levels of reported 'negative attitudes' were associated with increased negative behaviour, in this case, increased electric prod use. Similar results were reported in cattle and sheep plants, where a correlation was found between stockperson attitude and behaviour. Perceived lack of control; time constraints; and poor facilities at the slaughter plant, were associated with frequent use of forceful

handing techniques. The authors concluded that there could be an opportunity to improve stockperson behaviour and consequently improve welfare in slaughterhouses by targeting attitudes with appropriate educational and training material (Coleman et al 2012). An understanding of influences upon individuals' attitudes would be beneficial in directing any potential targeting or intervention.

There is evidence that a person's gender has influences on their attitudes. Research in the livestock industries has indicated that women appear to have more positive views towards animals and their welfare (Lensink et al 2000; Porcher et al 2004; Wambui et al 2018), which may be a result of higher levels of empathy when compared to men (Porcher et al 2004). However, little research has been undertaken on the impact of gender on the attitudes of those involved in the slaughter industry.

Some characteristics of employment within the slaughter industry have been shown to impact stockperson attitudes. The person's professional / employed roles within the slaughterhouse were found to influence reported 'aggression' scores, with those working at the 'load out' (handling dressed carcasses) having significantly higher 'aggression' scores than those in an office based role, however sample size in these case studies was small (Richards et al 2013). The same study also reported that time employed within the slaughter sector did not impact 'aggression' scores or a person's attitude towards animals as measured on the Animal Attitude Scale (Herzog et al 1991). Similarly, Wambui et al (2018) reported no significant association between the number of years of experience of Kenyan stockpeople and responses to animal welfare attitude statements.

Specific cognitive-behavioural training courses have been developed to target attitudes and behaviours of stockpeople (Coleman & Hemsworth 2014). Although there is evidence that these programs have been effective in improving stockperson attitude on commercial farms (Coleman et al 2000; Hemsworth et al 1994; Hemsworth et al 2002), the effects on abattoir personnel have not been explored.

As well as attitude, a person's beliefs about their job are important factors which can influence behaviour (Coleman et al 1998; Coleman et al 2003; Lensink et al 2000; Seabrook 2001). Work motivation, willingness to learn and job satisfaction are related to good stockmanship, and to positive

attitudes towards animals (Carless et al 2007; Coleman et al 1998; Hemsworth & Coleman 2011). Coleman et al (1998) documented a clear relationship between stockperson attitudes and job-related 'assessment subscales', indicating that stockpersons unhappy with their working environment are more likely to hold a negative attitude towards the animals they work with. Consequently, investigation of the beliefs of slaughter industry personnel, and their attitudes regarding their job is important since it may increase understanding of influences on animal welfare in the slaughter environment.

It may be important to note that, although the majority of existing studies have explored the effect of stockperson attitudes on welfare and factors that may impact such attitudes, Grandin (1988, 1998, 2005, 2018) describes the significant influence that the attitude of plant management has on the welfare conditions within an abattoir. Therefore, the attitudes of slaughter industry personnel in managerial roles also warrants further attention.

Given the potential impact of attitudes of slaughter industry personnel on animal welfare at slaughter, the aims of this study were to gain improved understanding of the attitudes that personnel involved in the European slaughter industry have towards animal welfare, their attitudes to their work, and the influences that gender and some employment factors have on such attitudes.

Materials and Method

Questionnaire development

It is not possible to measure attitudes directly; however, they can be inferred from both studying human behaviour (Hemsworth et al 1993) and responses to questionnaires (Hemsworth et al 2011). It was not possible to observe the behaviour of the individual respondents in this study, therefore questionnaire methodology was chosen. The questionnaire used was developed using a combined approach; review and summarisation of the scientific literature, alongside expert opinion elicitation, was used in the identification of suitable questions to be used in an anonymous, paper-based, two-part questionnaire. Part one consisted of 20 Likert items for which participants were instructed to respond on a five point scale, from 'Strongly Disagree' to 'Strongly Agree' regarding their view on statements

regarding either animal welfare, for example; ‘it’s important to me that animals have a life worth living’; and ‘I am willing to spend more money on animal welfare friendly products’, or working within the slaughter industry, for example; ‘Up to now I feel I have not received enough welfare training’, and ‘Time constraints mean that stock handlers do not have time to correctly handle livestock’.

Part two of the questionnaire consisted of questions designed to gather information on a person’s gender and characteristics of their employment; these included gender, length of time working in the slaughter industry, species they have worked with, attendance at previous welfare training courses, professional role in the slaughter plant, and whether the respondent held a current Certificate of Competence (CoC) for working with animals.

For analytical purposes, responses to ‘species involved with’ were categorised into:

- works with mammals (yes/no)
- works with birds (yes/no)

Responses to ‘role’ were categorised into:

- Stockperson – handling/shackling/stunning/sticking animals
- Management – occupying a managerial role (including supervisor) within a slaughter facility.
- Enforcement – working as a meat inspector or official veterinarian working within but not directly employed by the slaughter facility
- Non-abattoir – working in the wider slaughter industry but not based within a slaughter facility

Questionnaire delivery

The University of Bristol has been running two-day Animal Welfare Officer (AWO) and Poultry Welfare Officer (PWO) courses in the UK, EU and Globally for over 20 years. These courses are designed to transfer scientific knowledge regarding animal welfare to the slaughter industry. To be involved in the supply chain of certain retailers, slaughter plant personnel are required to attend the

training. All Official Veterinarians training at the University of Bristol complete both AWO and PWO courses, and the training is widely attended by welfare auditors, meat inspectors and those involved with assurance schemes. In order to maintain certification, participants are required to re-attend a course every three years.

Participants attending 11 University of Bristol AWO courses, six PWO training courses and two combined AWO/PWO courses held between May 2017 and October 2018 were invited to complete the questionnaire prior to the onset of the training. Of the 19 courses involved in the study 17 were held in the UK, one was held in Spain, and one was held in The Netherlands.

Statistical Analysis

Responses to each of the Likert items were analysed independently using SPSS, Version 24.0 (2018). To investigate the influence of gender and employment factors, an ordinal logistic regression with backwards variable selection was used.

A full ordinal logistic regression model including all variables (gender, role, stockperson/managerial, time in industry, species worked with (mammals/birds), previous welfare training, holder of a CoC) was used to estimate the effects on question responses. Using backward selection, variables were eliminated from the model one-by-one using a p-value of ≤ 0.05 as the exclusion criteria, starting with variables with the highest p-value, until only variables with a p-value of ≤ 0.05 remained in the model. Forward selection was used to confirm the results of the models developed following the backwards selection process. The final models were checked to ensure that they met the assumption of proportional odds, by using the test of parallel lines. For models which did not meet this assumption, a binomial logistic model with backwards selection was carried out using the same method. These models met linearity and multicollinearity assumptions.

Binomial variables, outlining either ‘agreement’ or ‘disagreement’ with the questionnaire statements were created by combing categories of ‘Strongly Agree’ and ‘Agree’, and ‘Strongly Disagree’ and ‘Disagree’. As responses of ‘Neither Agree nor Disagree’ did not suggest either ‘agreement’ or ‘disagreement’ with the statement, they were excluded from the model.

Results

A total of 215 questionnaires were collected, and all responses were included in the analysis.

Time working in the slaughter industry ranged from 0 to 50 years with the median being nine years. The respondents worked with all major livestock species (Table 1), with cattle (130), and poultry (102) being the most prevalent. The majority of respondents (142; 67%) worked with more than one species.

Insert Table 1

Over half of the respondents (112; 52%) held managerial roles within slaughterhouses, with nearly equal numbers working as stock people (32; 15%), enforcement officers (Official Veterinarians and/or Meat Inspectors employed by or contracted to government agencies) (32; 15%) and in non-abattoir roles (31; 14%). All those who answered that they worked in a non-abattoir role were involved in the wider slaughter industry, and this included retail auditors, corporate roles within meat processing companies, livestock buyers and slaughter equipment manufacturers.

Most respondents were male (149; 69%), 28% (61) were female, and the remainder (5; 2%) did not complete the question. Within the different roles, only one respondent identified as a female stockperson, while there were equal numbers (14) of males and females working in an enforcement role (Table 2). The majority of total respondents (148; 69%) had not previously attended an AWO/PWO training course – and this ranged from 78% of enforcement personnel to 67% of management. Of the total respondents, 52% (112) held a current CoC, which ranged from 84% of stock-people, to 29% of those in a non-abattoir-based role (Table 2).

Insert Table 2

The data from the responses to the Likert items is presented in Table 3.

Insert Table 3

Influencing factors

Of the 20 Likert items, the responses from five statements were not significantly influenced by any of the variables included in the model (no factors had a p value of ≤ 0.05 using backwards variable selection ordinal logistic regression model) (Table 4).

Insert Table 4

Table 5 and Table 6 show the results of the backwards selection ordinal logistic regression model and backwards selection binomial logistic regression model respectively.

Time in industry

An longer time spent working in the slaughter industry was significantly associated with both an increased likelihood of personnel feeling 'accomplished in their work' (Odds Ratio, OR 1.032) and of 'feeling upset when animals are seen to be mistreated' (OR 1.044). Those who had spent longer in the industry were also significantly more likely to disagree with the statement that '*welfare at slaughter is as good as it's going to get'* (OR 0.965).

Species

Personnel working with mammals were found to be significantly more likely to respond that they enjoyed working with animals, when compared to personnel who did not work with mammals (OR 2.85). The respondents who worked with mammals were also significantly more concerned about the pain, suffering and stress of animals, and were over two times (OR 2.35) more likely to agree that; '*all abattoir staff handling animals should receive welfare training'.* Personnel working with birds had significantly higher agreement scores when asked; '*current welfare legislation is too lenient'* (mean Likert score 1.45) compared to those who didn't work with birds (mean Likert score 1.22), yet those working with birds were significantly more likely to have lower agreement scores (OR 0.592) when answering: *'livestock animals are all individuals, and each have their own personality'*.

Role

Those working in an enforcement role within the slaughter industry were significantly more likely to respond indicating they did not feel 'accomplished in their role' (OR 2.80) there was also a lesser, yet still significant association of enforcement personnel agreeing that they 'emotionally detach from their day-to-day job' (OR 2.24). Stockpeople were found to be significantly more likely to agree that 'they get easily frustrated' when working with animals (mean Likert score 1.31) compared to those in other roles (mean Likert score 1.03). There were also significant agreement of stockpeople with the statement that 'production is everything' within the slaughter industry (OR 2.69).

Working in management or in a non-abattoir-based role did not significantly influence responses to any of the 20 Likert items.

Gender

Compared to females, male responders were over three times (OR 3.01) more likely to agree with the statement; '*welfare at slaughter is as good as it's going to get'* conversely, males were 1.95 times (OR 0.51) more likely to disagree with the statement; '*livestock animals are all individuals, and each have their own personality'*, 2.3 times (OR 0.435) more likely to disagree with the statement; *'I get upset when I see someone mistreat an animal'* and 2.26 times more likely to disagree with the statement*; 'it's important to me that an animal has a 'life worth living'.*

Previous AWO/PWO Training

Those with previous AWO/PWO welfare training were over two times more likely (OR 2.06) to report enjoyment of working with animals, and had significantly higher odds (OR 1.92) of agreeing with the statement; *'It is important to me that animals have a 'life worth living'*. These individuals were also over two times more likely to disagree (OR 0.408) with the statement; '*Up to now I feel I have not received enough welfare training'*, i.e. individuals who had received training are more likely to agree that they have had sufficient training.

Certificates of Competence

Responders holding a current CoC were also over two times (OR 0.484) more likely to disagree with the statement '*Up to now I feel I have not received enough welfare training'* and these respondents also scored significantly more positively to the statement '*Public concern about the welfare of animals is exaggerated'* (OR 1.704)

Insert Table 5

Insert Table 6

Discussion

In this study, the views of slaughter industry personnel regarding animal welfare in relation to their work were evaluated. To the authors' knowledge, this is the largest study of this kind to have taken place in the EU. As demonstrated in previous studies, gender and characteristics of employment can have an influence on a person's attitudes towards animal welfare and beliefs about their job, therefore potentially impacting human behaviour (Ajzen 1991) and animal welfare (Coleman et al 2003; Coleman et al 2012). Understanding the relationship between such factors, and the attitudes of personnel may benefit both human and animal welfare by enabling targeting and tailoring of recruitment, training, and provision of resources in the slaughter environment.

Time in the industry

Previous work has reported that the length of time working within the slaughter industry did not significantly influence an employee's attitude towards animal welfare (Richards et al 2013; Wambui et al 2018). Our study contradicts these findings, and our results suggest that those who have spent longer working in the industry have higher levels of empathy and feel more accomplished in their work. Empathy has been described as the emotional attachment of man and man (or man and animal) (English et al 1992) and empathy appears to be an antecedent to attitude rather than a direct determinant of behaviour (Ajzen & Fishbein 1980). However, there is evidence that empathy may be a predictor of positive attitudes towards animals (Beveridge 1996; Hemsworth & Coleman 2011). It may be that those people who choose to remain in the slaughter industry for longer periods of time are

instinctively more empathetic individuals, when compared to those who choose to leave. Another consideration is that those who choose to stay in the industry, do so because they have higher levels of job satisfaction, and this is highlighted in our results; with the greater reported feelings of accomplishment in longer standing employees. It has previously been shown that these positive views regarding job satisfaction do correlate with positive attitudes towards animals and can predict behaviour towards animals in a farm environment (Coleman et al 1998).

Although the age of the respondents was not requested in our questionnaire, this factor may have an important influence on personnel views. Kellert and Berry (1987) have described how older males have a more utilitarian and pragmatic view of animals. It is suggested that the practical value of animals increases in relevance with increasing age, as work and familial responsibilities rise in importance, however, the results of our work suggest that the professional role – and thus levels of responsibility – do not influence such responses.

Species worked with

All slaughterhouse staff involved in handling live animals (both mammals and poultry) must hold a CoC in accordance with EC1099/2009 (EC 2009), however the results of our study suggest that the attitudes of individuals may differ depending on whether they work with red or white meat species. Those working with mammals reported higher enjoyment level in working with animals, greater empathy, and increased appreciation for individual differences between animals, when compared to those working with birds. Bock et al (2007) reported similar findings when investigating relationships between EU farmers and their livestock; poultry farmers were described as having a 'lesser bond' with their animals and viewing birds as 'flocks' rather than individuals. The lack of attachment was explained in terms of the large number of birds, and the animals staying on the farm for a relatively short time. The results of our study could be explained in similar terms; large commercial slaughterhouses in the EU process birds in much greater numbers and at a much higher speeds when compared to mammals, and this is coupled with the smaller monetary value of individual birds compared to any commercially slaughtered mammal (red meat) species. In general, when mammals progress through an abattoir, they experience a greater number of human-animal interactions than do

poultry. For example, birds slaughtered by gas killing processes, are not handled by human hands, until they are dead or at least irreversibly unconscious. Once dead, animal welfare is no longer a direct consideration for the human operators handling the carcases. Increased human-animal interactions may be why people working with mammals are more likely to agree with the statement '*all abattoir staff handling animals should receive welfare training'*. Although human-animal interactions may be minimal, slaughter plant personal still play a vital role in ensuring adequate bird welfare conditions, for example by ensuring appropriate temperatures (Warriss et al 1999) and waiting times (Cockram & Dulal 2018) in the lairage and adequate stun quality of animals (EFSA 2013). Working with birds was associated with higher agreement scores with the statement '*current welfare legislation is too lenient'*, although this statement did not specify or describe specific legislation, it is assumed that those working with specific species would refer to the regulations related to their area and species of work. Council Regulation (EC) No 1099/2009 governs the protection of animals at the time of killing, and refers to the welfare of both mammals and birds (EC 2009). To the authors' knowledge there is little previous work on the attitudes towards animal welfare, and of personnel animal welfare beliefs, for people working in the poultry slaughter industry. Targeting these attitudes, for example by ensuring that slaughter plant employees understand the importance of welfare on individual animals, may have a positive impact on bird welfare in the slaughterhouse.

Employed role

Those in Enforcement roles (meat inspectors and official veterinarians) were significantly more likely to report that they 'attempt to emotionally detach' from their day-to-day job. Hamilton and McCabe (2016) reported similar findings after interviewing 20 meat inspectors working in a UK poultry slaughter plant. Those working in the slaughter industry experience routine, and day to day intentional killing, which, according to Baran et al (2016) induces chronic empathetic suffering which in turn influences slaughterhouse workers to distance themselves psychologically from their work. Although over half of the total responders were in agreement that working in the slaughter industry gives them a feeling of 'accomplishment', working in an enforcement role was significantly associated with lower agreement scores regarding 'accomplishment'. These results may potentially be attributed to the fact

that in the UK, the majority of people working in enforcement roles are agency-employed veterinary surgeons, who gained their qualifications from outside the UK. It has been suggested by some observers that such individuals are 'over-qualified' for abattoir work, and have entered the meat trade due to restrictions in the UK veterinary job market (Hamilton & McCabe 2016). Although the questionnaire in this study was only distributed to those in the slaughter industry, studies from Denmark have reported that slaughterhouse workers in general derive 'lower levels of meaning' ('meaning' assumed to be a positive attribute of work experience) from this work than do employees in 44 other occupations. (Baran et al 2016).

With the exception of gas killing of poultry, every animal that passes through an EU slaughter facility will interact with a stockperson. These individuals are responsible for the day-to-day, frontline, handling of the animals, and the mechanics of stunning and slaughtering. The rate at which animals are slaughtered determines the work rate (often set by the line speed) for the rest of the meat production line. In some countries, personnel working in the production line, including those handling livestock, have been paid on a piecework basis, where employee pay is based on the numbers of animals processed. It has been reported that such programs may encourage rough handling due to the rapid processing of animals being rewarded (Grandin 2003).

Stockmen were found to be significantly more likely to agree with the statement '*I feel that in the slaughter industry 'Production is everything''* and were found to be significantly more likely to agree that they '*get frustrated when working with animals'*. The modern meat industry has been described as one that 'thrives on the mass, speed and efficiency of the production line...workers are under pressure to slaughter a great number of animals in the least amount of time possible' (Hendrix & Dollar 2017). This feeling of time pressure may increase the likelihood of negative attitudes towards handling animals, and potentially influence negative animal-human interactions (Coleman et al 2003). However, in our study, just over a quarter of participants agreed, or strongly agreed that; *'Time constraints mean that stock handlers do not have time to correctly handle livestock.'*, and none of the variables (gender, time in the industry), when entered into the model to examine correlations, significantly influenced the responses. Workers' levels of stress and frustration do have a negative

346 impact on animals, if the behaviour of the personnel handling them is adversely affected, and altered
347 handling 'quality and care' can ultimately affect the level of production and meat quality (Porcher
348 2011). Therefore, the identification of causes of stockperson frustration do appear to warrant further
349 investigation.

350 Grandin (1988) comments that processing plants where managers have an attitude of humaneness
351 towards both animals and employees tend to have better managed, and more humane, slaughtering
352 operations. Although working in management did not significantly influence responses to any of the
353 included statements in our study, it is somewhat encouraging that the majority of views held by the
354 slaughter industry personnel who completed this study, were positive.

355 **Gender**

356 Aligning with previous studies, our study has found that males had less positive views towards animal
357 welfare when compared to females with regard to a number of the question statements. Porcher et al
358 (2004) suggested that males are more affected by emotional distancing when compared to females. In
359 a paper on the 'emotionography' of a slaughterhouse, McLoughlin (2018) describes how the ideal
360 slaughter worker echoes the ideals of 'hegemonic masculinity' (Donaldson 1993), meaning that
361 emotions are commonly denied, diminished or repressed. In our study sample, less than a third of the
362 respondents were female, with only one female stockperson respondent. This low proportion of
363 women may be possibly explained by general female attitudes towards animal killing. A study of
364 stockpeople working on a pig farm reported that females were 'reluctant' to kill pigs (Porcher 2008),
365 while female vets working in small animal practice have been shown to be more likely to disagree
366 with convenience euthanasia (Hartnack et al 2016). Although females may be more averse to killing
367 animals, stockwomen reportedly have a higher proportion of positive behaviours towards animals in
368 their care (Lensink et al 2000). From the results of our study, no conclusions can be drawn regarding
369 the difference in animal handling 'care' between male and female stockpeople in the slaughter
370 industry and to the authors' knowledge, no studies assessing the difference in handling 'care' between
371 male and female stockpeople and the impact on animal welfare, have been undertaken in a slaughter
372 facility. This may be due to the extremely low numbers of women working on slaughter lines.

Previous AWO/PWO training

Almost a third of respondents agreed, or strongly agreed, that they had not received enough welfare training in their current role, yet over 96% believed that all staff handling live animals should receive training. It is unsurprising that those with previous AWO/PWO training were more likely to agree that they had received enough welfare training. It is reassuring that those who have attended such courses believed that the training was 'enough', suggesting that the courses were meeting the perceived needs of those attending them. Training experience was also associated with a greater enjoyment in working with animals, and increased agreement with the statement that it is important that animals have a 'life worth living'. Unlike the cognitive behavioural training courses designed by Coleman and Hemsworth (2014), the AWO/PWO courses run by the University of Bristol are intended to provide delegates with the technical knowledge required to improve welfare at slaughter. The acquisition of new knowledge can change attitudes (Hemsworth & Coleman 2011; Waiblinger et al 2006) and while AWO/PWO training did 'improve' responses to the statements above, it is important to note that there were many statements where training experience was not significantly associated with any significant changes in views. Combining cognitive behavioural training techniques with 'traditional' knowledge transfer focused courses, may have a role to play in targeting attitudes of slaughter industry personnel, and hence driving positive welfare improvement.

Certificates of Competence

All operatives handling and auditing live animals in the EU require a CoC. In order to hold a CoC a person must participate in a formal training program and pass an examination (EC 2009). The training associated with acquiring a CoC, may partly explain why those personnel with a CoC are significantly more likely to agree that '*they have received enough welfare training'*. Interestingly, those individuals with CoCs were also more likely to agree with the statement that '*Public concern about the welfare of animals is exaggerated'*. Many public-facing campaigns by non-governmental organisations emphasise poor welfare practice within slaughterhouses. It could be argued that those responsible for day-to-day handling, stunning, and slaughter, within these facilities are more 'in-touch' with the

399 reality of animal welfare levels within abattoirs. However, Dillard (2008) suggests that those working
400 in the meat industry may acquire a lowered ability to empathise, and also to identify the pain suffered
401 by animals, yet holding a CoC was not significantly correlated with improved animal welfare related
402 statements in our analysis.

403 This study investigated the influence of gender and characteristics of employment by using
404 questionnaires to assess responses to statements regarding attitudes towards animal welfare, and
405 attitudes to work within the slaughter industry. It may be useful to consider that some statements were
406 not significantly affected by any of the factors considered in this work. For example, response to the
407 statements '*Animals feel pain just like humans do'* and '*I am willing to spend more money on welfare*
408 *friendly food products'* were not influenced by any of the gender, experience or role variables. The
409 reason as to why these statements were unaffected was not investigated in this study and there was no
410 apparent common theme to the statements. Animal welfare is a complex and multifaceted construct
411 that comprises cognitive and emotional dimensions. There may be other variables such as cultural
412 factors of individual backgrounds and their places of work, which may have impacted responses
413 (Serpell 2004).

414 A limitation of this study was the potential for bias introduced by the recruitment methods. The
415 respondents were drawn entirely from delegates who chose, or were supported by their employers, to
416 attend an animal welfare training course. It is possible that these people were more interested than
417 others in animal welfare, and so may not be representative of the wider population of slaughter
418 industry personnel. Some slaughter plants require all staff to attend AWO/PWO training, and this
419 could act to slightly reduce this potential for bias. Response bias also may have influenced results. It
420 can be argued that animal welfare at slaughter is considered a sensitive subject for those in the
421 industry and as such, respondents may have answered in ways that they believed to be 'appropriate' to
422 a welfare discussion, rather than by expressing their true and deeply held opinions. In an attempt to
423 combat such bias, all participants were made aware that all questionnaires would remain anonymous,
424 and that their responses contained no information which could be used to identify the respondent.

425 **Animal Welfare implications and conclusion**

For slaughter plants interested in advancing animal welfare, an understanding of the attitudes of their staff towards animal welfare and their job may be valuable. The results of this study suggest that the majority of views held by slaughter industry personnel towards animal welfare are positive, and that in addition, there are a range of factors which can influence these views and attitudes. Knowledge of the factors influencing the attitudes of slaughterhouse staff may allow those persons delivering welfare training within the EU to tailor the information and training material to certain characteristics of employment, and for employers to roles in slaughterhouses to recognise that there are specific challenges may be faced by individuals. In addition, this study raises important questions about the origins of certain views, an understanding of which may help in improving working conditions and animal welfare within slaughter plants.

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