

## Research article

## Consumer attitudes towards farm animals and their welfare: a pig production case study

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Recent years have seen an increase in public concern for farm animal welfare in the UK. However, sales of higher welfare meat and other animal-based food products are typically lower than their standard counterparts. The aim of this study was to determine both the prevalence of concern for farm animal welfare in a population, as well as the reasons for higher concern in some consumers as compared with others. In addition, the study focused on consumer attitudes towards pigs (*Sus scrofa scrofa*), and concern for their welfare, in particular, in order to identify areas which, if addressed, may help to increase consumer concern for pig welfare on farms, as well as increase consumer demand for higher welfare pork products. A questionnaire was designed with this in mind and disseminated to undergraduate students at the University of Chester. Concern for farm animal welfare, concern for the welfare of pigs on farms and reported willingness to pay extra for higher welfare pork products were all found to be influenced by consumer attitudes towards pigs, participant programme of study, awareness of pork production methods and previous exposure to a conventional pig farm. In addition, the results of the study indicate that a high level of ignorance regarding pork production methods is prevalent amongst UK consumers. In order to increase concern for pig welfare on farms, and thereby increase demand for higher welfare pork products, it was suggested that campaigns should aim to make clear the production methods used in conventional pork production systems in the UK.

**Key words:** farm animals, farm animal welfare, consumer attitudes, pig production.

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## Introduction

The management of production animals has changed significantly across the European Union (EU) over the past five decades. Over this time, animal agriculture has intensified and the number of animals per farm has increased, while the ratio of stockmen to animals has drastically decreased.<sup>1</sup> In addition, more and more animals have been moved to indoor housing systems with higher stocking densities, the use of prophylactic medicines and growth promoters has increased and animals are transported for longer distances as abattoirs have dropped in numbers but increased in size.<sup>2–4</sup> This intensification of the industry has led to an increase in animal productivity, but a decrease in the monetary value of any given animal.<sup>4</sup> Interest in farm animal welfare has risen in response to this change as evidence has shown that intensive systems may lead to a reduction in

farm animal welfare.<sup>4–6</sup> Several surveys show that consumers are concerned about the welfare of farmed animals,<sup>7–9</sup> and a considerable amount of scientific research has focused on the welfare of animals on farms in the last 20 years.<sup>3, 10, 11</sup> This in turn has led to an increased public demand for stricter welfare standards in farming, as is evident by the increase in policy debate<sup>7, 8</sup> and the introduction of new legislation.<sup>12–14</sup>

However, while consumers often report high concern for farm animal welfare, most consumers do not purchase higher welfare products,<sup>15</sup> and only 10% of consumers actively search for this information when making their food purchases.<sup>16</sup> This would suggest that consumers are either unwilling to pay for the extra cost involved in producing meat under higher welfare schemes, or are unaware of the welfare issues involved in conventional farming systems (conventional farming systems were referred to as ‘standard,

non-free range farms' in the questionnaire). Evidence would indicate that the former is unlikely, as willingness to pay (WTP) research has shown that consumers are happy to pay extra for non-battery eggs.<sup>7-9</sup>

The success of a farm animal welfare campaign, however, is contingent upon not only its ability to reach a considerable proportion of consumers, but also to present information, which will affect those consumers powerfully enough to alter their buying habits. As such, it is imperative to understand what causes consumers to be concerned with the welfare of farm animals and ultimately, what motivates them to purchase higher welfare products.

### Pigs and their welfare on farms

Pigs are the most common intensively raised mammal in the world,<sup>17</sup> with around 9 million pigs being reared annually in the UK alone.<sup>18</sup> Legislation to protect the welfare of these pigs currently goes beyond that required by EU law (e.g. Animal Welfare Act 2006, Welfare of Farmed Animals (England) Regulations 2007), but does not solve all of the welfare concerns associated with conventional pig production. In addition, there are several voluntary farm assurance schemes relating to the production of pork (e.g. RSPCA's Freedom Foods, Farm Assured British Pigs), which set higher standards for pork production and pig welfare.<sup>19</sup> As a result, there is a wide variety of labels on pork product packaging, making consumer choice particularly important.

If consumers are concerned about farm animal welfare and wish to make purchasing decisions in keeping with their values, then they must demand higher welfare standards for pigs on UK farms. Studies have shown that on the one hand, consumers value schemes to improve the welfare of laying hens, dairy cows and broiler chickens significantly more than one to improve the welfare of pigs,<sup>20, 21</sup> but on the other, consumers stated that they would stop buying pork if its packaging featured images of pigs kept tethered or in stalls.<sup>16</sup> This indicates that awareness may be key to changing consumer buying habits in order to better the welfare of pigs on farms.

### Consumer attitudes towards farm animal welfare

What constitutes acceptable treatment of farm animals is determined by legislation and consumer choice.<sup>7, 22</sup> However, consumers can only act in accordance with their animal welfare values if they are aware of the welfare issues surrounding livestock production. It is therefore vital that the information which, if effectively disseminated to the public, may lead to a change in demand for higher welfare products be identified, in order to improve the welfare of animals on farms.

Bennett<sup>7-9</sup> has conducted several surveys on consumer attitudes towards the welfare of farm animals and WTP to improve farm animal welfare. However, these surveys

merely indicate to what extent concern for farm animals and their welfare is prevalent in a population, without identifying reasons why some consumers show greater concern than others. The closest thing to research of this type is a limited number of studies done on personality correlates and concern for animals. Mathews and Herzog<sup>23</sup> investigated personality traits and attitudes towards non-human animals, and Austin *et al.*<sup>24</sup> identified personality traits associated with a higher concern for farm animal welfare in farmers and agriculture students. Identifying personality traits, which are associated with concern for farm animals however, does not improve our ability to increase concern amongst the general public through education. It is essential to gain an understanding of what motivates certain individuals to be concerned with animal welfare to a greater extent than others as this information can help to create more targeted campaigns to raise public awareness about farm animal welfare issues and, in turn, increase the demand for higher welfare products. The aim of the current study therefore, was to identify not only the prevalence of concern for farm animal welfare in a population, but also the possible reasons for that concern or lack thereof, using pigs and pork production as a case study. Three main areas were investigated, through the use of a questionnaire, in a sample of undergraduate students at the University of Chester, in order to pinpoint which may be linked to an increased concern for farm animals and pig welfare on farms:

- (i) consumer awareness of pork production methods;
- (ii) consumer attitudes towards pigs;
- (iii) consumer interest in animals and food.

### Consumer awareness of pork production methods

It is possible that the discrepancies between consumer concern for farm animal welfare and demand for higher welfare products mentioned above comes down to a lack of awareness. Consumers may be under the impression that animals on intensive farms experience high welfare, and so may continue to purchase standard products without intentionally going against their stated concern for farm animal welfare. Indeed, evidence suggests that ignorance and/or misconceptions regarding livestock production are prevalent amongst consumers,<sup>15, 16, 25, 26</sup> and those who are more aware are more likely to shop for higher welfare products.<sup>27, 28</sup>

### Consumer attitudes towards pigs

It is known that people vary in their attitudes towards animals depending on the species in question.<sup>29</sup> Likeability may affect consumer attitudes towards pigs in particular as the English language contains more metaphors, similes and idioms about pigs than any other non-human animal, and the overwhelming majority of these are negative.<sup>30</sup> Pigs may be disliked or misunderstood by consumers due to this

negative view of them manifested in British English language and culture. This may in turn be why consumers have not been as quick to demand higher welfare pork products as compared with higher welfare eggs for example.

### Consumer interest in animals and food

In addition to concerns about farm animal welfare, concerns about food quality and food safety have also increased in recent years. Studies show that consumers often consider food safety and quality among the most important attributes of fresh meat.<sup>6</sup> Both of these qualities are thought to be greater in higher welfare, as compared with standard, meat products.<sup>5, 6, 31, 32</sup> As such, consumers may show a heightened level of concern for farm animal welfare, and purchase better welfare products, for fear of poor meat quality and/or safety.

## Materials and methods

### Questionnaire design

In order to collect the appropriate information from participants, the questionnaire was divided into four parts. Part A presented participants with a list of 16 adjectives. Participants were asked which word or words they associated with domestic pigs in order to gain an understanding of participants' attitudes towards pigs in general. Eight of the chosen adjectives were 'negative' descriptors (given a score of -1), while the other eight were 'positive' descriptors of pigs (given a score of +1). All negative scores were then subtracted from all positive scores for every participant, giving each a pig likeability index (PLI) of between -8 and +8. In addition, participants who scored a PLI below 0 were considered low PLI participants, while those who scored 0 or higher were considered high PLI participants.

Part B of the questionnaire aimed to measure participant attitudes towards pig welfare on farms, as well as farm animal welfare in general. Likert scaled questions were used as the Likert procedure is the most appropriate for exploring theories of attitudes.<sup>33</sup> It involves presenting participants with a series of statements along with a five-point scale on which they can indicate the extent to which they agree or disagree with each respective statement.<sup>34</sup> An equal number of negatively weighted and positively weighted statements were used alternately in order to combat order effect, acquiescence and pattern answering as much as possible.<sup>35</sup> The scores given for the negatively weighted statements were later reverse coded so that a high response (i.e. 5) indicated high concern for farm animal and pig welfare, while a low response (i.e. 1) indicated low concern in order to test for reliability.

Part C of the questionnaire aimed to assess participant knowledge and understanding of pork production methods in the UK through multiple choice questions (Table 1).

**Table 1.** Awareness questions

Question	Answer
1. Gestation crates (also called sow stalls) are routinely used on pig farms in the UK.	No
2. Farrowing crates are routinely used on pig farms in the UK.	Yes
3. Pigs are given enough room to turn around at all times on pig farms in the UK.	No
4. Pigs have permanent access to suitable bedding (e.g. straw) on pig farms in the UK.	Yes
5. Pigs are able to see other pigs at all times on pig farms in the UK.	No

The correct answers were based on the minimum requirements which all UK pig farms must adhere to in accordance with the Welfare of Farmed Animals (England) Regulations 2007.<sup>36</sup> Correct answers were given a score of 1, while incorrect and 'Don't know' answers were given a score of 0, resulting in a combined score of between 0 and 5. Those who scored 3 or above were considered 'high awareness' participants, and those who scored 2 or fewer were considered 'low awareness' participants for the purpose of later statistical analyses. The last question in this section asked whether participants had any previous exposure to a working farm.

The final section asked for personal details. These were collected in order to separate participants into the three study programme groups (animal behaviour/animal behaviour and welfare [AB/ABW], nutrition/nutrition and dietetics [N/ND] and the control group of students on any other undergraduate degree programme, as well as ensure participants met the minimum age requirement of 18 years.

### Participants

Paper-based questionnaires were completed by students at the University of Chester. Most of the AB/ABW ( $n = 56$ ) and N/ND ( $n = 65$ ) participants were recruited through lectures, while most of the control group participants ( $n = 52$ ) were approached on a one-to-one basis, resulting in an opportunity sample.<sup>37</sup> All participants had to meet a minimum age criterion of 18 years, be enrolled on an undergraduate course at the University, and be a consumer of pork. Eleven questionnaires were removed from analysis due to participants not meeting one or more of these requirements, or because they were incomplete. The eventual sample consisted of 173 undergraduate students at the University of Chester. This sample size exceeds those reported in published studies investigating similar topics<sup>7, 38</sup> and so was considered suitably large. Ethical approval was granted by the University of Chester's Research Ethics Committee before any data were collected.

**Table 2.** Spearman's correlation coefficients for answers to Likert statements and PLI

Statement	$r_s$	$p$	Significant level
I am concerned about farm animal welfare.	0.290	0.000	$P < 0.01$
Farm animal welfare legislation does not need to be improved in the UK.	-0.244	0.001	$P < 0.01$
I am willing to pay extra for higher welfare pork products.	0.350	0.000	$P < 0.01$
The welfare of pigs on farms does not matter.	-0.417	0.000	$P < 0.01$
It is important that the pork I eat comes from pigs that lived happy lives.	0.290	0.000	$P < 0.01$
The taste of pork is more important than its origin.	-0.222	0.003	$P < 0.01$
I think intensive (standard, non-free range) pig farming is cruel.	0.378	0.000	$P < 0.01$
It does not matter how pigs are reared as they do not know any better.	-0.459	0.000	$P < 0.01$
Pigs should be able to express natural behaviours on farms.	0.353	0.000	$P < 0.01$
Pet animals deserve better treatment than farm animals.	-0.257	0.001	$P < 0.01$

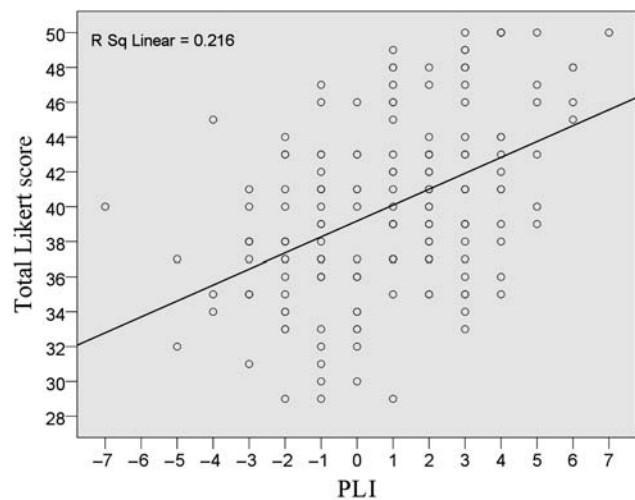
## Results

All data collected were entered into Statistical Package for the Social Sciences, version 16.0 for analysis. PLI, age and total Likert score (TLS—the sum of ratings for all statements) were all tested for normality using the Kolmogorov–Smirnov test.<sup>39</sup> As the tests showed that TLS,  $D(173) = 1.064$ ,  $P > 0.05$ , was normally distributed, parametric tests were used in any analyses involving TLS, whereas PLI,  $D(173) = 1.377$ ,  $P < 0.05$  and age,  $D(173) = 3.861$ ,  $P < 0.05$ , were not normally distributed and so non-parametric tests were used in any analyses involving these variables. However, some authors question the use of parametric tests for combined Likert scores as they argue that they cannot be considered truly interval data.<sup>40</sup>

Cronbach's alpha coefficient was calculated using the reverse-coded scores for the negatively weighted Likert statements from Part B of the questionnaire. The scores were reversed as Cronbach's alpha can only be calculated using scores which all carry the same meaning.<sup>41</sup> In other words, a response of 5, for example, must indicate high concern for farm animal welfare for both the positively and negatively weighted Likert statements. Cronbach's alpha was calculated to test item–item correlations in order to measure the overall reliability of the scale. As the alpha value ( $\alpha = 0.832$ ) was greater than the minimum threshold value of 0.7, the scaled questions were considered reliable.<sup>41</sup>

### PLI correlations

Spearman's correlation coefficients were calculated to examine whether PLI was correlated with answers given in Part B of the questionnaire. As can be seen in Table 2, PLI was significantly positively correlated with all of the positively weighted statements, while PLI was significantly negatively correlated with all of the negatively weighted statements. TLS was also significantly positively correlated with PLI,  $r_s = 0.451$ ,  $n = 173$ ,  $p = 0.000$ , as  $P < 0.01$ , as demonstrated by Fig. 1.



**Figure 1.** Scatterplot showing a significantly positive correlation between PLI and TLS ( $n = 173$ ).

### High vs. low PLI participants

High PLI participants were compared with low PLI participants with respect to their answers given to the Likert statements in Part B of the questionnaire using Mann–Whitney  $U$ -tests. All results were significant at the 0.05 level and many were also significant at the 0.01 level, showing that high PLI participants showed greater concern for farm animal and pig welfare than did low PLI participants, as summarized in Table 3. Furthermore, an independent samples  $t$ -test showed that high PLI participants ( $M = 41.17$ ,  $SD = 4.102$ ) had a significantly higher mean TLS than did low PLI participants ( $M = 37.53$ ,  $SD = 5.055$ ),  $t(171) = -5.107$ ,  $P < 0.01$ .

### Awareness of pork production methods

Mann–Whitney  $U$ -tests compared high awareness and low awareness participants with respect to their PLIs as well as their answers to individual Likert scaled questions from

**Table 3.** Mann–Whitney *U*-tests to compare Likert statement answers from HPLI participants to LPLI participants

Statement	Mdn (HPLI)	Mdn (LPLI)	<i>U</i>	<i>p</i>	Significant level
I am concerned about farm animal welfare.	4	4	2735.500	0.026	$P < 0.05$
Farm animal welfare legislation does not need to be improved in the UK.	2	3	2652.000	0.010	$P < 0.05$
I am willing to pay extra for higher welfare pork products.	4	4	2511.500	0.002	$P < 0.01$
The welfare of pigs on farms does not matter.	1	2	2135.500	0.000	$P < 0.01$
It is important that the pork I eat comes from pigs that lived happy lives.	4	4	2585.500	0.005	$P < 0.01$
The taste of pork is more important than its origin.	2	2	2567.000	0.005	$P < 0.01$
I think intensive (standard, non-free range) pig farming is cruel.	4	4	2291.500	0.000	$P < 0.01$
It does not matter how pigs are reared as they do not know any better.	1	2	2068.500	0.000	$P < 0.01$
Pigs should be able to express natural behaviours on farms.	5	4	2466.000	0.001	$P < 0.01$
Pet animals deserve better treatment than farm animals.	2	2	2714.500	0.015	$P < 0.05$

HPLI, high PLI ( $n = 113$ ); LPLI, low PLI ( $n = 60$ ).

**Table 4.** Mann–Whitney *U*-tests to compare PLIs and Likert statement answers in HA participants to LA participants

Variable/statement	Mdn (HA)	Mdn (LA)	<i>U</i>	<i>p</i>	Significant level
PLI.	3	1	791.000	0.001	$P < 0.01$
I am concerned about farm animal welfare.	4	4	1011.500	0.019	$P < 0.05$
Farm animal welfare legislation does not need to be improved in the UK.	2	3	827.000	0.001	$P < 0.01$
I am willing to pay extra for higher welfare pork products.	4	4	832.500	0.001	$P < 0.01$
The welfare of pigs on farms does not matter.	1	2	903.500	0.002	$P < 0.01$
It is important that the pork I eat comes from pigs that lived happy lives.	5	4	863.500	0.001	$P < 0.01$
The taste of pork is more important than its origin.	1	2	786.000	0.000	$P < 0.01$
I think intensive (standard, non-free range) pig farming is cruel.	5	4	1085.500	0.046	$P < 0.05$
It does not matter how pigs are reared as they do not know any better.	1	2	1067.000	0.032	$P < 0.05$
Pigs should be able to express natural behaviours on farms.	5	4	921.500	0.002	$P < 0.01$
Pet animals deserve better treatment than farm animals.	2	2	865.500	0.001	$P < 0.01$

HA, high awareness participants ( $n = 19$ ); LA, low awareness participants ( $n = 154$ ).

Part B of the questionnaire. All results were significant at the 0.05 level (most were also significant at the 0.01 level) and are summarized in Table 4. High awareness participants ( $M = 44.58$ ,  $SD = 4.834$ ) also had a significantly higher mean TLS than did low awareness participants ( $M = 39.33$ ,  $SD = 4.773$ ) as calculated by an independent samples *t*-test,  $t(171) = -4.515$ ,  $P < 0.01$ .

Finally, participants who had visited a conventional pig farm were compared with participants who had not. Mann–Whitney *U*-tests compared the two groups of participants with respect to their PLIs and responses to the individual Likert scaled questions. Just over half of the variables showed that participants with previous experience of a working pig farm showed significantly more concern for pig and farm animal welfare, as shown in Table 5. In addition, an independent samples *t*-test found that participants who had visited a pig farm ( $M = 41.83$ ,  $SD = 4.902$ ) scored a significantly higher mean TLS than did those who had not ( $M = 39.40$ ,  $SD = 4.973$ ),  $t(171) = 2.619$ ,  $P < 0.05$ .

### Programme of study

The three student groups were compared with respect to their PLIs as well as their answers to the individual statements in part B of the questionnaire, using a Kruskal–Wallis test. All of the results were significant at the 0.05 level (and all but one were significant at the 0.01 level) and are summarized in Table 6.

In order to investigate whether all of the three groups differed significantly from one another, Mann–Whitney *U*-tests were performed to compare each group of students to each other respective group. All results of tests comparing AB/ABW students to N/ND students were significant at the 0.01 level, while all results of tests comparing AB/ABW students to control students were significant at the 0.05 level (most were also significant at the 0.01 level). Tests comparing N/ND students to control students, however, were mostly non-significant with only two showing a significant difference at the 0.05 level.



**Table 5.** Mann–Whitney *U*-tests to compare PLIs and Likert statement answers in participants who had visited a standard, working farm to those who had not

Variable/statement	Mdn (yes <sup>a</sup> )	Mdn (no <sup>b</sup> )	<i>U</i>	<i>p</i>	Significant level
PLI.	2	1	1797.000	0.012	<i>P</i> < 0.05
I am concerned about farm animal welfare.	4	4	1757.500	0.005	<i>P</i> < 0.01
Farm animal welfare legislation does not need to be improved in the UK.	2	3	2154.000	0.203	ns
I am willing to pay extra for higher welfare pork products.	4	4	1854.000	0.013	<i>P</i> < 0.05
The welfare of pigs on farms does not matter.	1	1	2292.500	0.462	ns
It is important that the pork I eat comes from pigs that lived happy lives.	4	4	1952.000	0.035	<i>P</i> < 0.05
The taste of pork is more important than its origin.	2	2	2214.000	0.318	ns
I think intensive (standard, non-free range) pig farming is cruel.	4	4	2189.000	0.259	ns
It does not matter how pigs are reared as they do not know any better.	1	2	2121.500	0.151	ns
Pigs should be able to express natural behaviours on farms.	5	4	1963.500	0.029	<i>P</i> < 0.05
Pet animals deserve better treatment than farm animals.	2	2	1947.000	0.028	<i>P</i> < 0.05

<sup>a</sup>Yes, participants who answered yes to the question 'have you ever visited a working, non-free range, pig farm?' (*n* = 36).

<sup>b</sup>No, participants who answered no to the question 'have you ever visited a working, non-free range, pig farm?' (*n* = 137).

**Table 6.** Kruskal–Wallis tests to compare PLIs and Likert statement answers across study programmes

Variable/statement	Mdn (AB/W)	Mdn (N/D)	Mdn (C)	<i>H</i>	<i>p</i>	Significant level
PLI.	2	–1	1	19.618	0.000	<i>P</i> < 0.01
I am concerned about farm animal welfare.	4	4	4	20.318	0.000	<i>P</i> < 0.01
Farm animal welfare legislation does not need to be improved in the UK.	2	3	3	8.359	0.015	<i>P</i> < 0.05
I am willing to pay extra for higher welfare pork products.	4	4	4	17.396	0.000	<i>P</i> < 0.01
The welfare of pigs on farms does not matter.	1	2	2	24.500	0.000	<i>P</i> < 0.01
It is important that the pork I eat comes from pigs that lived happy lives.	4.5	4	4	24.573	0.000	<i>P</i> < 0.01
The taste of pork is more important than its origin.	2	2	2	18.429	0.000	<i>P</i> < 0.01
I think intensive (standard, non-free range) pig farming is cruel.	5	4	4	26.041	0.000	<i>P</i> < 0.01
It does not matter how pigs are reared as they do not know any better.	1	2	2	20.809	0.000	<i>P</i> < 0.01
Pigs should be able to express natural behaviours on farms.	5	4	4	36.249	0.000	<i>P</i> < 0.01
Pet animals deserve better treatment than farm animals.	2	2	2	21.618	0.000	<i>P</i> < 0.01

AB/W, *n* = 56; N/D, *n* = 65; C, *n* = 52.

A one-way ANOVA test showed that the three groups differed significantly in their mean TLSs,  $F(2, 170) = 28.407$ ,  $p = 0.000$ , at the 0.01 significance level. A Tukey HSD test allowed post hoc comparisons to be made. It showed that the mean TLSs were significantly different in AB/ABW students ( $M = 43.48$ ,  $SD = 4.251$ ) as compared with N/ND students ( $M = 37.69$ ,  $SD = 3.925$ ) and control students ( $M = 38.83$ ,  $SD = 5.044$ ), respectively, while N/ND students' mean TLS was not significantly different from the mean TLS of control students, as can be seen in Fig. 2.

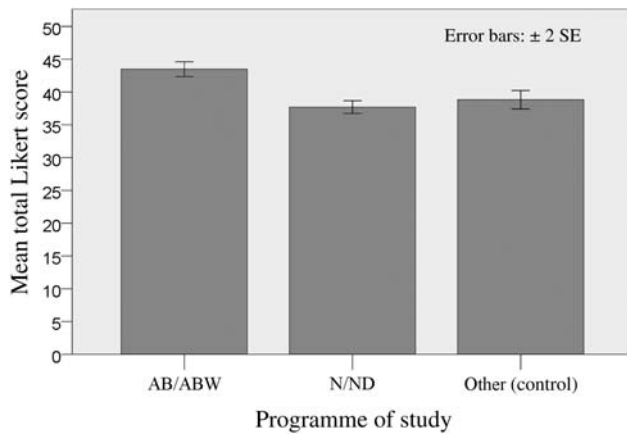
## Discussion

The aim of this study was to identify possible influences on consumer concern for pig welfare on farms, as well as farm animal welfare more generally. The results suggest that

consumers who show the highest levels of concern are more likely to associate positive attributes with pigs, more likely to be interested in animals, more likely to be aware of modern pork production methods, and are more likely to have been exposed to a working pig farm sometime in the past.

### Awareness of pork production methods

Students who showed a greater awareness of pork production methods had significantly higher PLIs, showed a greater concern for farm animal welfare, showed a greater concern for pig welfare on farms and were more willing to pay extra (Participants were asked to rate the extent to which they agreed with the statement 'I am willing to pay extra for higher welfare pork products.' Willingness to pay extra was not measured using WTP methodology.) for



**Figure 2.** Bar chart with standard error bars showing a significant difference in the mean TLS in AB/ABW ( $n = 56$ ) as compared with N/ND ( $n = 65$ ) and control students ( $n = 52$ ), but not between N/ND students and control students.

higher welfare pork products than students who showed a lower level of awareness of pork production methods. Bennett<sup>22</sup> has pointed out previously that concern for farm animal welfare amongst the public revolves around awareness. Similarly, Beardsworth and Keil<sup>42</sup> interviewed 76 vegetarians and found that one of the major factors which led to their cessation of meat consumption was an increased awareness of the effects of farming on animals. The results of this study would support such findings. However, as can be seen in Table 4, the high awareness group consisted of only 19 students. This means that out of 173 participants, of which 56 were enrolled on an AB/ABW undergraduate course, only 19 answered 3 or more of the 5 awareness questions correctly. Furthermore, none of the participants answered all of the five questions correctly, and only one answered four questions correctly. This indicates a substantial lack of knowledge amongst the consumers surveyed in this study. Indeed, several other studies have reported high levels of ignorance and/or misconceptions among consumers regarding livestock production methods.<sup>15, 16, 25, 26</sup> As almost a third of the students surveyed were enrolled on an AB/ABW course at the University of Chester, it is reasonable to assume that an even greater lack of awareness would be found if this study was repeated on a representative sample of the general public. As such, there is a clear need to improve public understanding and awareness of pork production methods in the UK to allow consumers to make informed decisions when purchasing pork. If consumers are unaware of production methods but at the same time are concerned about the welfare of pigs on farms (as was the case of the sample surveyed in this study) they may be making purchases, which are not in keeping with their attitudes towards farm animal welfare. Increasing awareness of

pork production methods amongst the public may therefore lead to an increase in demand for higher welfare pork products. However, it is important to remember that consumer ethical values, religious beliefs and culture may also play a role in consumer purchasing decisions.

A related issue, though not investigated here, is that of labelling. A recent survey commissioned by the RSPCA found that only 2 per cent of those questioned understood the meaning of the terms ‘outdoor bred,’ ‘free range’ and ‘outdoor reared.’<sup>43</sup> This is consistent with the results of a study by Schröder and McEachern<sup>16</sup> who interviewed 30 Scottish meat consumers about their value conflicts surrounding their food purchases. Most of those interviewed stated that their understanding of meat quality logos was poor and that they felt misled by labels. It is clearly important therefore, that any effort to increase concern for farm animal welfare amongst the public in order to increase demand for higher welfare products, be coupled with a demand for clearer labelling. Only if consumers understand the terms used on meat product labels can they make informed decisions in keeping with their animal welfare values.

Whether or not students have previously visited a conventional working pig farm also appears to be a significant factor in relation to concern for farm animal welfare, pig welfare on farms and willingness to pay extra for higher welfare pork products. This relates to awareness of production methods as those students who reported having visited a conventional pig farm would have been exposed to the conditions and management practices common to conventional pork production in the UK. A recent Eurobarometer survey<sup>27</sup> focused on attitudes towards farm animal welfare in consumers across the EU and found that visits to farms where animals were reared increased both awareness of, and concern for, the welfare of animals on farms. Furthermore, as the number of visits to working farms increased, so too did willingness to pay extra for higher welfare products.<sup>27, 28</sup> The authors suggest the possibility of an awareness campaign to promote concern for farm animal welfare through visits to farms. The results of the present study support this idea, as they indicate that exposure to a working farm leads to increased concern for farm animal welfare and willingness to pay more for improved welfare products.

### Pig likeability index

It is perhaps unsurprising that participants who scored higher PLIs showed greater concern for pig welfare on farms. Indeed, there appears to be a link between a given species’ likeability and concern for its welfare amongst the public. Evidence suggests that attitudes towards animal use vary among individuals, depending on the animal species in question,<sup>29, 44</sup> with those animals that are more familiar

to, and generally more liked by, the public being more 'worthy' of protection than others.

It is possible that consumers show greater levels of concern for those production animals of which they are more fond. This could in turn lead to a greater willingness to pay for higher welfare products produced from those animals. It is interesting to note in this respect, that the Mann–Whitney *U*-tests comparing high PLI participants to low PLI participants differed in their significance depending on whether the Likert statement asked about farm animals or pigs specifically. As can be seen in Table 3, the three statements concerning farm animals differed significantly at the 0.05 level, while those statements that concerned pigs differed at the 0.01 level, suggesting that PLI was specifically linked to increased concern for pig welfare on farms, as opposed to all farm animals.

Studies show that stock people who express positive attitudes towards livestock are more likely to treat their animals more humanely.<sup>45, 46</sup> This is similar to the findings of the current study as those participants who associated the greatest number of positive attributes with pigs (high PLI participants) reported the greatest level of concern for pig welfare on farms as well as a greater willingness to pay for higher welfare pork products. Concern for the welfare of farm animals has been shown to be positively correlated with a greater willingness to pay to improve farm animal welfare in previous studies.<sup>7, 8</sup> Thus, more positive attitudes towards pigs in consumers may lead to more positive 'treatment' of pigs through purchasing choices.

### Programme of study

AB/ABW students reported significantly higher concern for farm animal welfare generally and pig welfare on farms, a greater willingness to pay for higher welfare pork products, and significantly higher PLIs than did N/ND students or control students, respectively. This is perhaps an unsurprising finding, and is likely due to a number of factors. Firstly, AB/ABW students are likely more concerned with issues of animal welfare in general, regardless of the animal in question or use thereof. Also, AB/ABW students likely feel more positively towards animals in general. Secondly, AB/ABW students were likely more aware of pork production methods and so may have been more concerned about pig welfare on farms due to a greater awareness of the issues surrounding pork production in the UK. Indeed, 15 of the 19 students who were in the high awareness group were AB/ABW students, representing some 79% of all high awareness students.

N/ND students did not differ significantly in their responses when compared with control students. Significant differences did exist between N/ND students and the control students on the statements 'it is important that the pork I eat comes from pigs that lived happy lives' ( $P <$

0.05) and 'I think intensive (standard, non-free range) pig farming is cruel' ( $P < 0.01$ ). However, the control students agreed with both of these statements significantly *more* than the N/ND students despite better welfare being linked to increased meat quality,<sup>31, 32, 47</sup> and consumers typically associating more intensive production systems with a reduction in meat safety.<sup>5, 6, 48, 49</sup> It is possible that N/ND students did not differ significantly from the control students because they were unaware of the interconnectedness of farm animal welfare and issues of meat quality and safety. Alternatively, they may be fully aware that meat produced under circumstances, which promote better animal welfare is often better in quality and safer for human consumption, but may simply not value these qualities or be unwilling to pay the extra cost involved in producing meat under such systems. In any case, this study failed to find any evidence that consumers interested in human health and nutrition value animal welfare on farms any more than a group of control consumers.

### Conclusion

This study found that higher PLIs, being enrolled on an AB/ABW course, higher levels of awareness of pork production methods, and a previous visit to a conventional working pig farm in the past were all associated with a greater concern for farm animal welfare, pig welfare on farms and an increased willingness to pay extra for higher welfare pork products in a sample of undergraduate students. This study highlights potential areas of interest to groups working to secure higher welfare standards for livestock in the UK. However, due to the nature of the sample population used in this study, it is impossible to consider such results more than preliminary. If studies using more representative samples find similar results then this would indicate the need to test whether increasing awareness on these issues could lead to an increased level of concern for pig welfare on farms, and an increased demand for higher welfare pork products. As such, future research could involve evaluating the effectiveness of campaigns at increasing concern for farm animal welfare and demand for higher welfare products through reducing public ignorance regarding farm animals and their welfare.

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### Author biography

Jacqueline Tawse graduated from the University of Chester, where she gained a first-class BSc with honours



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