

Students' attitudes to animal welfare and rights in Europe and Asia

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Abstract

A survey of attitudes towards the welfare and rights of animals was conducted in universities in 11 European and Asian countries, to improve understanding of cultural differences that might impact on trade and international relations. Collaborators' universities were recruited in each country to assist in the design, translation and administration of the survey via the internet in a convenient selection of the country's universities, providing 3,433 student responses from at least 103 universities. Respondents rated the acceptability of 43 major concerns about animals (focused on type of use, animal integrity, killing animals, animal welfare, experimentation on animals, changes in animal genotypes, the environment for animals and societal attitudes towards animals). Students from European countries had more concern for animal welfare than students from Asian countries, which may be partly explained by increased affluence of European students as there was a positive correlation between student expenditure and concern for animal welfare and rights. Southern and central European countries had most concern for animal rights and unnatural practices. Those in communist or former communist countries in Asia and Europe had most concern about killing animals and those in northern European countries the least. Regional similarities between neighbouring countries were evident in responses to animal issues and there were no differences between ethnic groups within a country. Thus, there were national and continental differences in European and Asian students' attitudes to animals' welfare and rights, which appear to arise as a result of the socio-political situation in regions rather than religious or other differences.

Keywords: animals, animal welfare, Asia, culture, Europe, nation

Introduction

The diversity of attitudes to animals around the world is testament to the influences of different cultures (integrated patterns of human knowledge, belief and behaviour). Key drivers may include religion, economic situation, and uses of animals, as determined by the climatic and historical situation of a region. Cultural traditions lead to empathy being demonstrated principally to those animals from which economic or emotional benefit is obtained, such as companion animals, although there is also a focus on animals that are genetically similar to humans, in particular primates (Phillips 2009).

Culture perpetuates the different positions that animals hold in human society throughout the world. Whilst in many Western societies animals have been used for the physical benefits they can provide (food, clothing etc), this is static or declining (Beardsworth & Bryman 2004; Van Wezemaal *et al* 2010). In emerging economies, the use of animals for food (Speedy 2003) and as pets is increasing rapidly in response to the community's greater purchasing power. At the same time people are becoming more urbanised and removed from close contact with production animals. Cultural attitudes towards animals may have arisen partly in response to variation in the necessity of

using animals for peoples' physical needs. This is greater in harsh climates than in more benign situations where agricultural crops provide most food and clothing (Phillips 2009). Such differences have been perpetuated through regional cultures, even though trade now makes many animal products available internationally.

Despite culture maintaining regional differences in attitudes to animals, in recent decades a growing concern for animal welfare and rights has been apparent in some parts of the world. This may derive from increased economic development (EC 2005), the industrialisation of animal farming and experimentation practices, increased relative importance of companion animals compared to farm animals, and/or the extension of a social movement that has, to-date, focused on humans' rights (Fraser 2008; Mellor *et al* 2009).

A better understanding of cultural attitudes towards animals and how they are used by humans can promote understanding and tolerance if there are clear differences between trading nations (Turner & D'Silva 2006). This may benefit trade in live animals, for example the trade between Australia and the Middle East, which has had on several occasions to be temporarily restricted by the Australian government following welfare issues on the transporting ships and in the recipient countries (Phillips 2005). In addition, the use of animals in teaching should take account of cultural differences in students' attitudes towards animals (Phillips & McCulloch 2005).

A small cross-cultural study of attitudes towards animal use and animal sentience has been conducted recently, of students of the English language who were visiting British universities (Phillips & McCulloch 2005). This survey found that students in European countries had greater concern for animal welfare, but not rights, than students in Asian countries. Also of interest was the increased level of concern for animals that were perceived to be more sentient, providing evidence that attributed sentience drives level of concern. It is also possible that students tried to justify their greatest concerns by attributing animals at risk with increased sentience.

The present study aimed to increase our understanding of cultural differences in attitudes towards use of animals in different Eurasian countries, using a translated survey, a more representative and larger student population from a wider range of countries than previous studies and avoiding the potential bias of only surveying English language students.

Materials and methods

This survey was approved by the University of Queensland Human Ethics Committee, Australia, and methodology has been described in full previously (Meng 2009) and in a conference proceedings (Meng *et al* 2009).

Survey methodology

In brief, a call was distributed through relevant organisations, eg International Society for Applied Ethology, for volunteer academic collaborators to organise the survey in their country. Suitable collaborators volunteered in

21 countries worldwide, but those in nine countries dropped out over the course of the project, leaving 12 countries finally representing a convenience sample. Subsequently, Portugal was also excluded because of the low response rates to the survey. Those remaining represented a broad spectrum of cultures and geographical regions of Europe and Asia (China, Czech Republic, Great Britain, Iran, Ireland, Macedonia, Norway, Serbia, South Korea, Spain and Sweden). Respondents were also asked to identify their ethnic group, determined for each country from the book, *Ethnic Groups Worldwide* (Levinson 1998) and *World Factbook* (2010) (Meng 2009). In all cases, except Norway and Sweden, where access to entire student populations by e-mail was possible, collaborators organised a team of student volunteers in a representative sample of universities in their country. Student volunteers approached students at a central location in the university (not related to any subject area) and asked them if they would take part in a social survey. The avoidance of terms such as animal welfare or animal rights in the invitation was deliberate and was anticipated to reduce the potential bias of respondents interested in animals being more likely to complete a survey on animals if asked to do so. A pilot survey was conducted at the University of Queensland to test the methodology for recruitment of questionnaire respondents, which elicited a 50% willingness to take part in the 100 students approached and 17 completed questionnaires were returned. In total, responses were received from respondents that were primarily at 103 universities in the main survey, with the target number of respondents in each country being related to the population. If they agreed, the respondents were asked to give their e-mail address to the volunteer. The survey format and content was discussed and agreed by all collaborators, and the survey was then translated by the collaborators into the native language, since these people were most familiar with the animal welfare terminology used. Some of these translated versions were translated back and changes made in the case of discrepancies, and in all cases the survey meaning and translation was checked by a third party for accuracy and consistency of meaning, in conjunction with the collaborator. Web-links to the survey were then distributed to the students by e-mail with an accompanying password. In the case of Norway and Sweden, the initial approach to students was by e-mail.

The questionnaire

An initial section of the questionnaire asked about demographic details. Respondents were asked about their age, gender, nationality, ethnic group, level of education, area of study, place of residence, religious affiliation, food avoidance and reasons why food was avoided, and animal protection organisation participation. In addition, there was one question about their financial status, which asked how much money they estimated that they usually spent per month, including all living expenses, housing and any sundry expenses (in the local currency unit).

Respondents were then asked about the acceptability of forty-three animal issues and importance of thirteen world issues. The 43 issues were originally based on the major human concerns about our use of animals. These are: i) the purpose for which animals were kept; ii) animal integrity; iii) killing animals; iv) animal welfare; v) experimentation on animals; vi) changes in animal genotypes; vii) animals and the environment; and viii) societal attitudes towards animals. Each concern was represented by approximately five questions. The questions were chosen by the project team, including country collaborators, to be of international, not regional concern, and to be mutually exclusive, ie addressing distinct topics that did not overlap. They are listed in *Appendix 1*. Respondents were asked to rate the acceptability of the practices described on a Likert scale of 1, extremely unacceptable to 5, extremely acceptable.

Thirteen questions were asked concerning major world social issues and respondents were asked to give their opinion about how important each issue was to them, on a scale of 1, not important, to 7, extremely important (Meng 2009). Thus, a high score meant that they believed it to be an important issue, not whether they supported it or not. The issues were: animal protection (W1); professional ethics (W2); capital punishment (W3); environmental protection (W4); racial equality (W5); genetic engineering (W6); equality for lesbian, gay, bisexual and transgender (W7); human cloning (W8); human euthanasia (W9); reducing poverty (W10); sustainable development (W11); women's rights (W12); and peace and security (W13).

Respondents were also asked to rank the following animals in relation to their capacity for feeling (hereafter termed sentience): cat; cattle; chicken; chimpanzee; dog; dolphin; fish; horse; human infant; octopus; pig; and rat, using the approach of Herzog *et al* (1991).

Statistical analysis

Data were initially cleaned and examined for potential sources of bias (Meng 2009). We found no evidence of bias, for example in the willingness of Asian country respondents to use extreme scores, compared to respondents from European countries. One source of error was detected from a graph of Euclid distance of sentience levels of different animal species to the mean (Meng 2009). Some respondents clearly rated animals in reverse order for sentience levels by mistake, and responses were reversed. The removal of respondents that had insufficient time to complete the questionnaire adequately was rejected after careful scrutiny of the data. Responses to the 43 Animal issues were subjected to a Principal Component Analysis with Varimax rotation that weighted sample size for each country and included all variables with loadings ≥ 0.20 (Meng 2009). This identified seven indices that represented views on Animal welfare, Animal rights, Unnatural practices on animals, Killing animals, Animals in experimentation, Wildlife and Animals as spiritual symbols (indices adopted from Meng 2009, but renamed for greater clarity). The questions (see *Appendix 1*

for text) upon which the indices were based, and formulae for creating the index scores from the 1–5 rating by each respondent, were as follows (listing the questions in declining order of importance):

- Animal rights index = $104 - 2.6 A8 - 2.4 A1 - 1.9 A12 - 1.8 A3 - 1.6 A13 - 1.6 A10 - 1.6 A5 - 1.5 A4 - 1.2 A9 - 1.1 A7 - 0.8 A.2$, $R^2 = 16.9\%$;
- Animal welfare index = $98.8 - 6.2 A18 - 5.2 A13 - 4.3 A17 - 2.7 A12 + 2.5 A2 - 1.6 A9 - 0.5 A5$, $R^2 = 15.9\%$;
- Unnatural practices on animals index = $116 - 4.0 A28 - 3.9 A30 - 3.4 A27 - 3.0 A31 - 2.5 A3 - 2.2 A7 - 2.3 A36 - 1.9 A8 + 1.9 A12 + 1.9 A10 - 1.7 A2$, $R^2 = 10.1\%$;
- Killing animals index = $107 - 3.6 A14 - 3.4 A22 - 3.1 A11 - 3.1 A4 - 2.8 A15 + 2.6 A36 - 2.3 A32 - 2.2 A8 - 2.0 A1 - 2.0 A12 + 2.0 A20$, $R^2 = 9.3\%$;
- Animals in experimentation index = $115 - 5.2 A24 - 4.0 A26 - 3.5 A23 + 3.3 A36 + 2.2 A8 + 2.2 A30 + 1.9 A37 - 1.9 A43 - 1.8 A33 - 1.8 A1 + 1.7 A18$, $R^2 = 6.7\%$;
- Wildlife index = $92 - 4.9 A37 - 4.4 A33 - 4.1 A36 - 3.2 A34 + 2.7 A22 - 2.6 A16 + 2.2 A14 - 2.0 A20 + 1.9 A25 - 1.8 A2 - 1.8 A9$, $R^2 = 6.2\%$;
- Animals as spiritual symbols index = $108 - 6.5 A39 - 5.6 A40 - 4.9 A2 - 3.1 A6 - 2.3 A42 - 2.2 A9 - 1.8 A23 + 1.8 A29 - 1.8 A38 + 1.5 A35 - 1.3 A28$, $R^2 = 4.0\%$.

For negative variables included in the indices, a high index score meant a low level of acceptability of the issue, whereas for positive variables, which are in a minority, a high index score meant a high level of acceptability.

A factor analysis was conducted for the World issues that summarised attitudes to these issues in one value, containing the following questions (again, in order of declining importance):

- World issues index = $0.17 W4 + 0.16 W10 + 0.16 W11 + 0.16 W12 + 0.16 W5 + 0.15 W13 + 0.15 W1 + 0.15 W2 + 0.1 W7 + 0.09 W3 + 0.09 W6 + 0.08 W9 + 0.04 W8$.

Binary logistic regression, ANOVA, and Chi-squared analyses were compared in terms of their effectiveness for modelling the responses to animal issues. Both binary logistic regression and ANOVA gave similar and more discriminating results than Chi-squared and the data either approximated a normal distribution or could be manipulated to a normal distribution, hence ANOVA was selected for its flexibility for modelling the data. Following an initial analysis, the residual data distribution was examined and where necessary transformed to approximate a normal distribution. This was only required for one variable, the Animal welfare index, and a squared function gave the necessary approximately normal distribution. The model for data responses included nation, ethnic group (nested within nation), gender, level of education, area of study, place of residence, religious affiliation, food avoidance and reasons why food was avoided and animal protection organisation participation. Only nation and ethnic group

Table 1 Recruitment and response rates from individual countries.

Country	Recruitment rate (%)	Number of e-mail addresses	Number of completed questionnaires	Secondary response rate [†] (%)	Overall response rate [‡] (%)
China	77	8,211	1,018	12	10
Czech Republic	67	1,779	939	53	35
Great Britain	77	259	54	21	16
Iran	23 [§]	573	133	23	6 [§]
Ireland	34	600	45	8	3
South Korea	NA	1,984	309	16	NA
Macedonia	NA	492	101	21	NA
Norway	NA	382	261	68	3 [§]
Serbia	NA	469	207	44	NA
Spain	75	1,741	162	9	7
Sweden	NA	287	204	71	5 [§]

[†] Number of completed questionnaires/number of e-mail addresses; [‡] Number of completed questionnaires/number of students approached; [§] Approximate values; NA: Not available.

Table 2 The demographics of students from the eleven countries in the study.

Country	Gender (%)		Mean (\pm SEM) age of respondent (years)	Proportion of life spent with pets (%)
	Female	Male		
China	49	51	21.3 (\pm 0.069)	0.19
Czech Republic	57	43	21.8 (\pm 0.083)	0.51
Great Britain	67	33	24.1 (\pm 0.18)	0.67
Iran	32	68	28.5 (\pm 0.54)	0.23
Ireland	60	40	21.6 (\pm 0.83)	0.63
South Korea	37	63	23.9 (\pm 0.24)	0.17
Macedonia	51	49	22.6 (\pm 0.35)	0.41
Norway	79	21	27.3 (\pm 0.49)	0.61
Serbia	64	36	24.1 (\pm 1.10)	0.40
Spain	57	43	22.7 (\pm 0.37)	0.48
Sweden	82	18	25.7 (\pm 0.37)	0.72

are considered in this paper, with responses about food avoidance published elsewhere (Izmirli & Phillips 2011). Responses to Animal and World issues were clustered by country and issues, using dendograms to depict the similarities. Step-wise regression was used to link responses to World issues to the Animal indices derived from the responses to the 43 Animal issues. Responses to ranking of sentience were examined for distribution of residuals following an analysis of variance using the model described above, and this followed an approximately normal distribution. Finally, stepwise regressions were used to relate responses in the Animal and World issues indices to student monthly expenditure in US\$, using an alpha

value of 0.05 for variables to enter the models. All analyses were conducted using the statistical packages Minitab 15 and SPSS 15.

Results

Response rates

In total, 3,433 responses were received. The number of people approached was not recorded in several countries, so it was not possible to determine an initial response rate (Table 1). In countries where it was recorded it varied from approximately 25 to 77%. The response rate varied from 8 to 71% and was higher in the two countries using e-mail for the initial approach.

Table 3 Differences between nations in mean acceptability of issues relating to Animal welfare, Animal rights, Unnatural practices on animals, Killing animals, Animals in experiments, Wildlife, Using animals as spiritual symbols and World issues.

	Animal welfare issues	Square of animal welfare issues	Animal rights issues	Unnatural practices on animals	Killing animals	Animals in experimentation	Wildlife	Animals as spiritual symbols	World issues
China	72.8	5,533 ^f	62.8 ^c	57.5 ^e	58.1 ^c	72.1	66.0 ^a	47.9 ^{ef}	9.6 ^c
Czech Republic	84.1	7,179 ^b	66.7 ^b	76.7 ^{ab}	57.6 ^c	75.8	56.7 ^{cd}	49.1 ^e	9.1 ^d
Great Britain	85.9	7,362 ^b	63.4 ^c	75.0 ^b	37.6 ^g	70.0	57.2 ^c	46.0 ^f	9.6 ^c
Iran	80.4	6,506 ^d	56.3 ^e	26.9 ^f	45.6 ^e	75.2	61.3 ^b	57.1 ^c	10.1 ^b
Ireland	85.5	7,229 ^b	63.5 ^c	74.8 ^{bc}	39.6 ^f	67.4	67.4 ^a	37.4 ^g	8.6 ^e
South Korea	75.3	5,802 ^e	58.4 ^d	62.1 ^e	54.9 ^d	66.7	54.4 ^d	66.7 ^a	7.7 ^f
Macedonia	87.6	7,677 ^a	67.0 ^b	66.7 ^d	73.1 ^a	67.4	48.8 ^e	51.1 ^{de}	9.1 ^d
Norway	82.6	6,905 ^c	62.7 ^c	72.0 ^c	36.1 ^g	78.0	59.5 ^{bc}	53.0 ^d	9.3 ^d
Serbia	85.4	7,279 ^b	71.5 ^a	71.8 ^c	67.0 ^b	72.9	56.1 ^{cd}	59.0 ^b	9.5 ^{cd}
Spain	81.8	6,756 ^{cd}	67.3 ^b	79.6 ^a	47.0 ^e	68.1	68.3 ^a	62.8 ^b	10.6 ^a
Sweden	79.3	6,417 ^d	57.0 ^{de}	74.9 ^{bc}	37.2 ^g	65.8	45.8 ^f	52.5 ^d	8.4 ^e
SED	–	117.32	0.75	1.34	1.09	1.12	1.04	1.16	0.092
P-value	–	< 0.0001	< 0.001	< 0.0001	< 0.0001	0.20	< 0.0001	0.001	< 0.0001

High values indicate low levels of acceptance (country means with different superscripts are significantly different, $P < 0.05$, by Student's *t*-test).

Demographics

Iran and South Korea's respondents were mostly male, in contrast to other countries, for example Sweden and Norway whose respondents were mostly females. Respondents from Iran and Norway had a mean age that was greater than other countries, with respondents from Ireland and China having the lowest mean age (Table 2). In Sweden and Great Britain, respondents had spent the greatest proportion of their lives with pets, and in China and South Korea they had spent the least.

Animal indices

The country with the highest Animal welfare index score was Macedonia, followed by Serbia, Great Britain and Ireland, which were statistically identical (Table 3). Next were the other European countries, Czech Republic, Spain and Norway and Sweden, then the Asian countries, Iran, South Korea and lastly China.

Serbia had the highest Animal rights index score, followed by the other southern and central European countries, Macedonia, Spain and the Czech Republic. This was followed by three northern European countries, Ireland, Great Britain and Norway, and China, and then South Korea and Sweden. Iran had the lowest Animal rights index score.

The Unnatural practices on animals index was highest for the European countries: Spain, then Czech Republic and Sweden, Great Britain, Ireland, Norway and Serbia, and then Macedonia. This index score was lowest for South Korea and China and finally Iran.

The Killing animals index score was highest for Macedonia, then Serbia, and then Czech Republic and China. Middle Killing animals index values were held by South Korea, Spain and Iran. Lowest Killing animals index values occurred for the northern European countries Ireland, Great Britain, Sweden and Norway. The Animals in experimentation index was not significantly affected by respondents' nationality.

The Wildlife index was highest for Spain, Ireland and China, then Iran and Norway, then Serbia, Czech Republic and Great Britain, followed by South Korea and Macedonia, and finally Sweden.

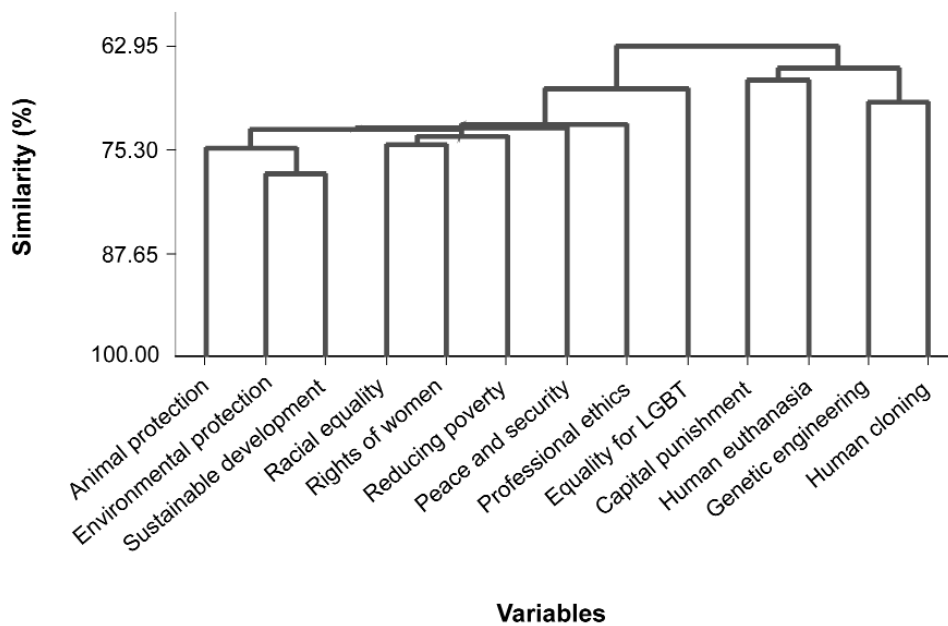
The greatest acceptance of the use of Animals as spiritual symbols was by Irish respondents, then respondents from Great Britain and China. This was followed by the respondents from Czech Republic and Macedonia, then Norway and Sweden. Finally, respondents from Serbia, Iran, Spain and South Korea had the lowest acceptance.

Ethnic differences were only significant for the Animals as spiritual symbols index ($P = 0.03$), but there were no significant differences between different ethnic groups within countries, only between ethnic groups in different countries. Because the primary focus was for ethnic differences within countries, this variable was not considered further.

The World issues index

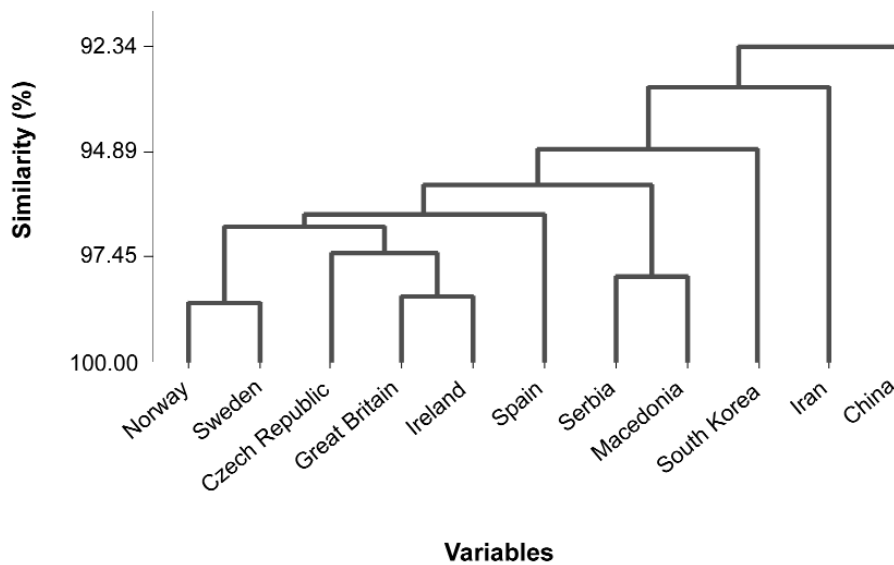
The World issues index was, from highest to lowest, Spain, Iran, Great Britain, China, Serbia, Norway, Macedonia, Czech Republic, Ireland, Sweden and South Korea. The two most closely connected World issues were environmental

Figure 1



Dendrogram of similarity in responses to 13 World issues.

Figure 2



Dendrogram of similarity in responses from the 11 nations to 43 Animal issues.

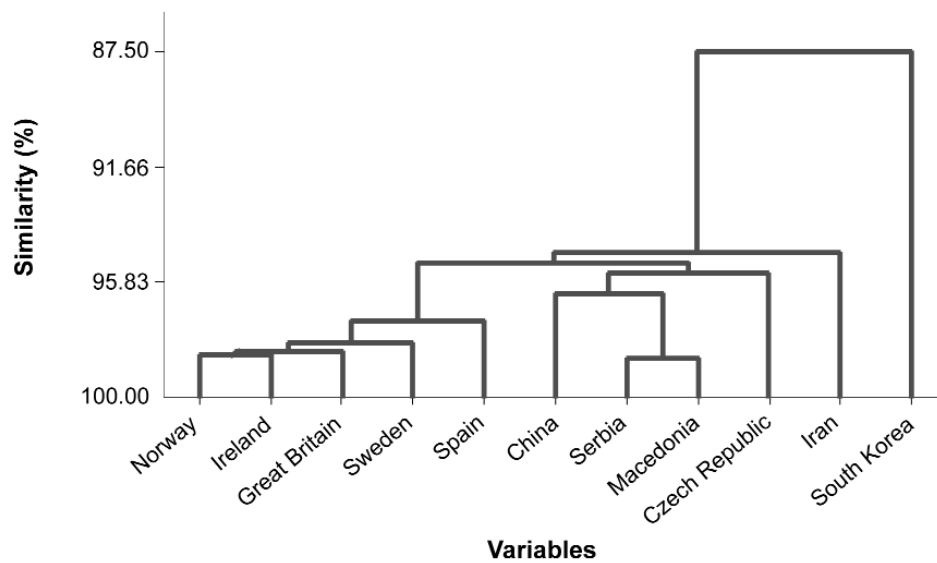
protection and sustainable development (Figure 1). The next closest to these two was animal protection. There was a cluster of responses to human rights issues: racial equality, women’s rights, reducing poverty, equality for lesbian, gay, bisexual and transgender (LGBT), which was joined by two other issues: professional ethics and peace and security. Finally, there were similarities in responses to capital

punishment and human euthanasia, and also to genetic engineering and human cloning.

Clustering of Animal and World issues results between countries

Responses to Animal issues were most similar between Norway and Sweden (Figure 2). Two other close pairs of

Figure 3



Dendograms of similarity in responses from the 11 nations to 13 World issues.

countries were evident, Great Britain and Ireland, and Serbia and Macedonia. Czech Republic responses were most similar to the Great Britain/Ireland responses, and Spain was similar to the other Western European countries. South Korea, Iran and China all had dissimilar responses to the European countries.

Responses to World issues were most similar between the respondents in western European countries: Norway, Ireland, Great Britain, and Sweden and to a lesser extent, Spain (Figure 3). Respondents in Serbia and Macedonia also had very similar responses to each other and were joined by the other former communist country, Czech Republic, and the communist country, China. Respondents in Iran and South Korea had different responses to these two major groupings (the Western European countries and communist or former communist countries).

Student expenditure

Mean student monthly expenditure estimates (US\$ [\pm SEM]) differed between countries, those with different superscripts being significantly different ($P < 0.05$) by Student's *t*-test (Iran 1,442^a [\pm 201], Norway 1,025^b [\pm 138], South Korea 955^{bc} [\pm 156], Great Britain 913^c [\pm 178], Sweden 892^c [\pm 132], Ireland 872^c [\pm 201], Spain 733^d [\pm 163], Serbia 728^d [\pm 143], Czech Republic 612^e [\pm 128], Macedonia 604^e [\pm 151] and China 284^f [\pm 123]). Respondents' expenditure was significantly related to their Welfare index score, with no significant intercept, as follows:

Expenditure (mean monthly US\$) = 7.5 (\pm 0.04) Welfare index score; $n = 3,461$, $P < 0.001$.

A step-wise regression analysis across countries found that there was a significant ($P < 0.001$) but weak relationship between mean student expenditure in each country and the mean position on the animal indices of each country as follows:

Mean student expenditure in the country (US\$ per month) = 741 – 6.3 Killing animals index + 0.08 Animal welfare index² – 6.1 Wildlife Index + 5.3 Animal Rights Index, $r^2 = 0.07$, $P < 0.001$.

Animal sentience

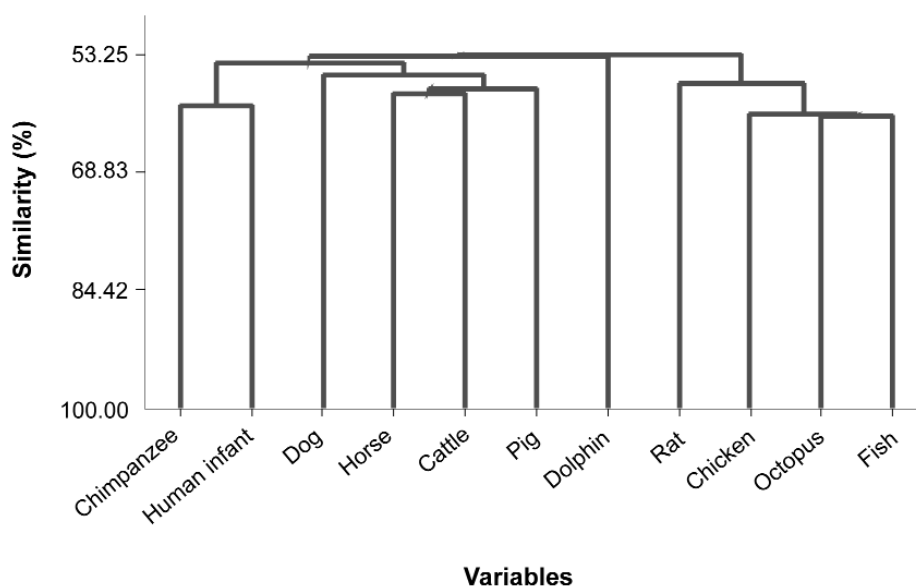
The overall order of attributed sentience (Mean rank [\pm SEM]) for the different species, from the highest to lowest, was human infant (10.7 [\pm 0.043]) > chimpanzee (9.7 [\pm 0.040]) > dog (9.5 [\pm 0.030]) > dolphin (8.6 [\pm 0.044]) > cat (7.7 [\pm 0.035]) > horse (7.2 [\pm 0.034]) > cattle (5.5 [\pm 0.034]) > pig (5.2 [\pm 0.039]) > rat (4.8 [\pm 0.045]) > chicken (3.8 [\pm 0.032]) > octopus (2.7 [\pm 0.038]) > fish (2.6 [\pm 0.039]).

Chinese respondents gave a relatively high sentience rating to the rat, dog and the marine animals, fish and octopus (Table 4). The rating for the dog was even higher than that attributed to human infants. Iranian respondents gave a particularly high rating to humans and also gave a high rating to the horse and cat. South Korean respondents gave particularly high sentience ratings to dogs and cats. Respondents in Norway, Sweden, Britain and Ireland all rated fish to have relatively low sentience. The Swedish respondents rated sentience in chimpanzees higher than in human infants. The similarity of responses was greatest between octopus and fish, and also between chimpanzees and human infants (Figure 4).

Table 4 The perceptions of sentience in specified animals by respondents from different nations.

	Human infant	Chimpanzee	Dog	Dolphin	Cat	Horse	Cattle	Pig	Rat	Chicken	Octopus	Fish
China	8.5 ^d	8.4 ^d	9.7 ^a	8.5	8.4 ^c	6.9 ^d	5.0	4.4 ^e	7.2 ^a	4.1 ^{bc}	3.5 ^{ab}	3.7 ^a
Czech Republic	10.4 ^b	9.7 ^{bc}	9.5 ^{ab}	9.0	8.7 ^b	7.8 ^{bc}	4.7	5.4 ^c	5.1 ^b	3.3 ^d	2.5 ^c	1.8 ^{cd}
Great Britain	10.8 ^{ab}	10.2 ^{ab}	8.5 ^c	9.3	8.2 ^c	7.8 ^{bc}	4.3	5.9 ^b	5.4 ^b	2.8 ^e	3.5 ^a	1.4 ^d
Iran	11.0 ^a	9.6 ^{bc}	9.2 ^b	8.3	9.4 ^a	9.3 ^a	4.4	4.9 ^d	3.8 ^e	3.5 ^d	1.9 ^d	2.8 ^b
Ireland	10.2 ^{bc}	9.5 ^{bc}	9.1 ^b	8.2	8.7 ^{bc}	7.7 ^c	4.3	6.3 ^a	4.5 ^d	4.1 ^{bc}	3.4 ^{ab}	1.9 ^c
South Korea	10.2 ^{bc}	9.4 ^c	9.5 ^a	8.9	9.4 ^a	7.5 ^c	5.8	5.1 ^{cd}	4.5 ^d	3.9 ^c	2.0 ^d	1.8 ^{cd}
Macedonia	10.3 ^{bc}	8.8 ^d	9.2 ^b	9.4	8.5 ^c	6.5 ^d	4.3	4.4 ^e	4.4 ^d	5.7 ^a	2.9 ^{bc}	3.6 ^a
Norway	9.9 ^c	9.9 ^b	9.2 ^b	8.0	9.2 ^{ab}	7.7 ^{bc}	4.9	6.6 ^a	5.1 ^b	3.6 ^{cd}	2.2 ^{cd}	1.7 ^{cd}
Serbia	9.9 ^c	9.2 ^c	9.7 ^a	9.1	9.0 ^b	7.9 ^b	4.4	5.3 ^c	4.3 ^d	4.3 ^b	2.5 ^c	2.5 ^b
Spain	10.4 ^b	9.6 ^b	9.5 ^{ab}	8.9	9.2 ^{ab}	7.3 ^c	5.0	5.8 ^b	3.8 ^e	3.9 ^c	3.1 ^b	1.7 ^{cd}
Sweden	9.2 ^c	10.41 ^a	9.3 ^{ab}	9.4	8.6 ^c	7.5 ^c	5.2	6.6 ^a	5.3 ^b	3.2 ^d	1.6 ^d	1.7 ^{cd}
SED	0.21	0.19	0.15	0.22	0.17	0.16	0.16	0.18	0.20	0.16	0.18	0.19
P-value	< 0.001	< 0.001	0.04	0.09	0.05	< 0.001	0.066	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

Country means with different superscripts are significantly different, $P < 0.05$, by Student's *t*-test. High values indicate high levels of attributed sentience.

Figure 4

Dendograms of similarity in responses to sentience ranking of 11 animal species.

Discussion

One of the limitations of this study was the inability to conduct a back translation due to financial limitations of the study and difficulties in finding other people suitably qualified in animal welfare to back translate the questionnaire (Brislin 1970; Harkness *et al* 2003). In addition, many other factors may have had an influence on the attitudes reported, in particular gender (which is reported separately; Phillips *et al* 2011). The use of modelling techniques in this study for statistical analysis ensured that nationality effects

could be extracted in isolation from the other factors. This approach was preferred to the adoption of quotas for the principal demographic variables to make maximum use of the data obtained. However, one concern about the use of this technique relates to representation of the various countries. Although clear differences could be detected with some confidence when there was good representation, for example China and Czech Republic, for countries with low numbers of respondents the conclusions must be much more tentative. A further issue concerns the reliability of the

indices used. Although the clustering technique reliably clustered students' responses, it was sometimes difficult to understand exactly what the cluster referred to. We acknowledge that there are some anomalies in some clusters in relation to the variables included. For example, the Killing animals index is influenced by A22 (observing animal behaviour in an experiment), and also by A36 (destroying the habitat of endangered species). This may indicate that this index included a component of concern about wildlife conservation and experimentation on animals. However, we believe it is more accurate to use the mathematical-clustering technique to group the variables, rather than the artificial areas of concern that were defined at the start of the study.

In the present study, nationality was more important than belonging to an ethnic group, demonstrating the importance of nationhood. Ethnic groups have gradually assumed less importance over the 20th century as a result of globalisation, although there is a greater recognition of the need for tolerance towards ethnic groups as part of social reform.

We observed that respondents in the European countries in our study had greater concern for the welfare of animals than those in Asia. Our survey showed that Chinese respondents had much lower expenditure than respondents in other countries, but this was not the case for respondents in Iran and South Korea. The significant relationship overall could derive from the large number of Chinese respondents in the survey, with there being a significant relationship between expenditure and Animal welfare index score in that country. Monthly student expenditure does not necessarily indicate the level of affluence, but includes variables such as charges for tuition. The student expenditure indicated in this survey bears an approximate relationship to the cost of living in these countries (Consumer price index rank: Norway 1, Ireland 7, Great Britain 10, Sweden 13, Spain 16, South Korea 18, Czech Republic 28, Serbia 35, Iran 45 and China 55, with no data for Macedonia) (Cost of living index 2010). Economic status can alternatively be indicated by Purchasing power parity (PPP; World Bank 2003). The world PPP ranking of countries in our survey, out of a total of 150 with 1 the highest and 150 the lowest, was Norway 4, Ireland 9, Great Britain 21, Sweden 26, Spain 35, South Korea 50, Czech Republic 56, Iran 88, Macedonia 92, Serbia 112 and China 118. This also demonstrates that Asian countries in our survey tended to have lower purchasing power than the European countries. Macedonia and Serbia tended to have low PPP but may have a favourable cultural predisposition towards animal welfare for reasons that are discussed below. It should also be noted that attitudes will be formed over considerable time, and some of the Asian countries in our survey have only recently increased in prosperity (eg South Korea).

The only similar multinational survey of attitudes to animals is the Eurobarometer (EC 2005, 2007). European people surveyed in the Eurobarometer considered the welfare and the protection of farmed animals to be superior in the EU compared to other regions in the world. However, even though the new Member states and the Southern states were less convinced of this superiority (EC 2005), an over-

whelming majority believed it was at least not worse than elsewhere. The welfare and protection of farmed animals was judged differently for each species, with the conditions for laying hens being judged to be worse compared to pigs and dairy cows. Furthermore, laying hens and chickens kept for meat production (broilers) were the species for which respondents wanted to most improve current levels of welfare and protection (EC 2005). In the present study, it was found that perceived sentience of chickens was almost the lowest of any animal species included, which may indicate that lower standards are more likely to be tolerated for this species, compared with others.

The second Eurobarometer survey (EC 2007) found that 60% of respondents believed that welfare protection had improved in their country over the last ten years. Compared to other European countries, Scandinavian countries had the greatest concern for animal welfare in farm production systems, as well as eastern Mediterranean countries. We found a particularly strong support for animal welfare issues in eastern Mediterranean countries, since the Welfare index scores for Macedonia and Serbia were in the top three countries. This could derive from a prolonged influence of the classical Greek approach to animals. The Pythagoreans (6th–4th century BC) and the Neoplatonists (3rd–6th century AD) both emphasised respect for animals' interests, primarily because they believed in the transmigration of souls between human and animal bodies (Pythagoras 1999). These two countries were later influenced by, in chronological order, the Ottoman and Russian civilisations. The Ottoman influence also gave importance to the care and protection of animals, in particular birds (Ozen & Ozen 2006). The high position of Macedonia and Serbia, both former Yugoslav states, in the Animal welfare and rights indices may also derive from their recent liberation from totalitarian rule. As such, it may be an increase in income, rather than absolute income (Clark *et al* 2008), which generates a feeling of well-being, extending to requiring better conditions for animals. Societal changes in the former Communist countries have been most pronounced for young people, which include the respondents in our survey (Illner 1998). Hence, we suggest that recent changes in these two countries may assist in the explanation of the high scores for these two indices.

Respondents from Macedonia and Serbia also scored highly on the Killing animals index, alongside China and the Czech Republic, perhaps demonstrating a desire for animals to have freedom of choice to live or die. There is a common perception that after World War II communism created institutionalised nations, whereas Western nations returned to liberal principles and subsumed minority rights under a doctrine of individual human rights (Deets 2006). However, post-communist and communist states are now beginning to embrace the primacy of individual identity, as in the Macedonian 1992 Constitution, which includes the text:

Macedonia is established as a national state of the Macedonian people, in which full equality as citizens and permanent co-existence with the Macedonian people is provided for Albanians, Turks, Vlachs, Romanians and other nationalities living in the Republic of Macedonia (Deets 2006).

Respondents may wish this recent recognition of human rights to be extended to animals, in terms of their life choices. Lowest scores on this index were provided by those nations with longest established democratic systems of government, ie the northern European states.

The Czech Republic and Great Britain scored highly on the Animal welfare index, the former may be because of a positive attitude following the demise of communism. In contrast to this, the Eurobarometer study (EC 2005) found that Czech people had the least concern for animal welfare when purchasing meat. Great Britain's high score on the Animal welfare index may relate to the high level of industrialisation of animal use in farms and scientific laboratories in that country and the opposition to this. However, Great Britain also has a history of social democratic reform involving animals (Gregory 2007) and minority activist groups, which may have increased the concern for animal welfare in respondents. We did not confirm a strong attitude towards animal welfare or animal rights in Sweden, conflicting with the results of the Eurobarometer. This could be due to the much wider range of topics considered in our survey than in the Eurobarometer (EC 2005). In addition, there were fundamental differences between the two surveys in the questions asked. The Eurobarometer asked people in each country whether they perceived that the welfare of animals was given enough importance in their countries' policies, and most Swedish people believed that it was, whereas those in Greece mostly believed that it was not, supporting our result that Macedonian respondents had a high level of concern for animal welfare. Swedish and Norwegian people also believe, more than other European countries, that the welfare of dairy cows is adequate in their country, which could stem from the relatively strong animal welfare legislation and high level of attention paid to dairy cow welfare issues in that country (Kjaernes & Lavik 2008). By contrast, we posited various animal injustices and asked how acceptable they were to respondents in the different countries. These results arguably relate more closely to the level of concern for animal welfare in general than the specific issues posited in the Eurobarometer survey. It is likely that people in Sweden find many issues acceptable because they believe that strict controls are in place. Even potentially harmful issues, eg AI19 inflicting pain and injury (in laboratory animals), are so relatively well controlled that people assume that they must be necessary otherwise they would not be allowed. A further indication of the reason for this unexpected position of Swedish respondents may lie in their bottom position in the Wildlife index, which probably derives from the close connection that many respondents have with the countryside in that country. In Sweden, human interaction with nature is relatively well controlled, eg hunting and trapping is highly regulated and usually well and responsibly carried out (Anon 2011).

The Animals in experimentation index was not affected by country, despite much prominence given to this topic in countries such as the United Kingdom with major laboratory animal activities (eg FRAME 2011). A recent survey has demonstrated considerable concern amongst

Chinese people about the use of animals in laboratory research (Davey & Wu 2007).

The Iranian score on the Animal rights index and the Unnatural practices on animals index was lowest of any country, and it was also low for the Animal welfare index. This could be due to the lack of anchorage of concern for animals in the legal system. There is currently no legal protection for research animals, for example, and such animal protection as there is derives largely from the Islamic scriptures (Izmirli *et al* 2010). These contain many exhortations to treat animals well but do not specifically address some of the greatest concerns of today's activist groups, for example the intensive housing of poultry. By contrast, Iranian respondents displayed a high level of concern for World issues, demonstrating a level of awareness that may emanate from their contact with the outside world through modern media. The failure to extend these concerns to animals may be because of the focus of attention on human rights issues, as addressed in the World issues. This pre-occupation with human problems over and above animal issues at times when the former dominate has been used to explain the failure of the other major world monotheistic religion, Christianity, as evidenced in the *New Testament of the Bible*, to adequately address animal issues for today's society (Phillips 2009). In Europe, and particularly Scandinavia, the high level of legislative control of animal welfare and rights is likely to imbue confidence that animal welfare and rights are adequately controlled.

Phillips and McCullough (2005) found significant differences between respondents of different cultures in their perceptions of animal sentience and attitudes. Human babies were perceived as less sentient than a dog or a monkey, but in the present study the human infants were judged by respondents in most countries to have greater sentience than all other animal species. Infants may have been judged as older than babies and therefore more sentient because in some societies the word infants variably refers to a child under the age of seven, a child before it can speak or walk, whereas the word baby universally refers to individuals aged between birth and one year. The attribution by Chinese respondents of greater sentience to a dog than a human infant has been famously supported by Jeremy Bentham, who expressed the view that:

a full-grown ...dog is beyond comparison a more rational, as well as a more conversable animal than an infant of a day or a week, or even a month old (Bentham 1789).

Chicken sentience in the earlier survey was higher than that of a rat, but the present study reversed the order, probably because of the many Chinese respondents, who had a high appreciation of rat sentience. In China, rats are included in their horoscope and considered courageous and enterprising (Man-Ho 1994), in contrast to most other countries where they are usually considered to be pests (Kamarudin 1983).

In the sentience hierarchy, non-mammalian aquatic animals are accorded the lowest levels of sentience (Driscoll 1992), demonstrating a speciesist approach that does not necessarily accord with physiological assessments of sentience. According to

Frewer *et al* (2005), Dutch citizens believe that they are more knowledgeable about the welfare of pigs than fish, although absolute levels of knowledge about animal welfare were low for both pigs and fish. Their research suggests that citizens think about the welfare of animals in two broad categories, their health and their living environment, but in no more detail than that. They suggest that emotional responses to animal welfare increase the perceived importance of these concerns.

The different ranking for rat, dog and the marine animals, fish and octopus, in China, demonstrate how the culture in that country can affect sentience perceptions, which according to Phillips and McCullough (2005) will then correlate with the perception of whether practices involving the animal species are considered cruel or not. Iran gave the highest ranking to human infants, perhaps demonstrating the advocacy of greater value of humans compared to animals in the *Koran*. This is also evident in the *Bible*, but Christianity is followed much less in secular European countries than the Islamic faith is followed in Iran. The other animals with high sentience ratings in Iran were the horse and cat, both traditional iconic animals in Persian society. South Korean respondents rated sentience as high in dogs and cats, and anecdotally pet ownership is increasing rapidly in popularity in that country with the pets are acknowledged to be 'spoiled' (Chao 2003).

Animal welfare implications

An improved understanding of the attitudes of people in different Eurasian countries towards the welfare of animals will facilitate trade relations and the creation of international standards. The recognition of economic drivers for animal welfare concerns should encourage rich nations to financially support improved standards in the developing countries with which they trade. The attitudes of respondents from different countries also need to be considered in the use of animals in teaching, particularly in multicultural situations. The study should encourage greater recognition of differences in cultural attitudes to welfare of animals.

Conclusion

Nationality had a major influence on students' attitudes towards animal welfare and rights, whereas ethnic minority grouping generally did not. Differences between nationalities appear to be partly explained by differences in economic status of respondents and partly by the extent of legislation concerning animal use in the country concerned.

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Dedication

This paper is dedicated to the memory of Dr Vonne Lund, the Norwegian collaborator on this project, who passed away during the course of this study.

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Appendix I Animal issue (AI) questions used in the survey within eight main themes.

Theme 1: Use of animals

- AI No 1 Keeping animals for the production of food or clothing
- AI No 2 Keeping animals as pets
- AI No 3 Keeping animals for the education of the public in zoos, wildlife parks, etc
- AI No 4 Using animals for work
- AI No 5 Using animals for entertainment or sports

Theme 2: Animal integrity

- AI No 6 Operations on animals to improve their health
- AI No 7 Decoration of animals, such as dyeing or cutting their hair for aesthetic reasons
- AI No 8 De-sexing by hormone implants
- AI No 9 Removal of a body part, such as tail docking or de-clawing
- AI No 10 Marking animals by branding or ear notching
- AI No 11 Removal of dead tissue, such as hair/wool removal or foot trimming

Theme 3: Killing animals

- AI No 12 Killing young animals that are dependent on their parents
- AI No 13 Allowing animals to experience pain during slaughter
- AI No 14 Using animals for products after their natural death
- AI No 15 Killing animals when they are seriously injured or ill
- AI No 16 Euthanising healthy and unwanted pets because of overpopulation

Theme 4: Animal welfare

- AI No 17 Depriving animals of their needs for food and water
- AI No 18 Depriving animals of an appropriate environment to rest, including shelter
- AI No 19 Inflicting pain, injury or disease on animals
- AI No 20 Not providing sufficient space, proper facilities and company needed for animals
- AI No 21 Subjecting animals to conditions and treatment which cause mental suffering

Theme 5: Experimentation on animals

- AI No 22 Observing animal behaviour in an experiment
- AI No 23 Experiments to improve animal welfare or health
- AI No 24 Medical experiments using animals to improve human health
- AI No 25 Testing cosmetics or household products on animals
- AI No 26 Operating on living animals for the benefits of human medicine research

Theme 6: Changes in animals' genotypes

- AI No 27 Increasing animals' reproductive or productive capabilities by genetic changes, eg cows producing more milk
- AI No 28 Increasing animals' health or disease resistance by genetic changes
- AI No 29 Creating farm animals that are more profitable because they feel happy with little stimulation and have little desire to be active
- AI No 30 Genetic selection of pet animals, such as dogs and cats, to increase their rarity, potential for showing or pedigree value
- AI No 31 Genetic modification of crops grown for animal foods

Theme 7: Animals and the environment

- AI No 32 Killing animals because they are not native to the area where they live
 - AI No 33 Killing wild animals to stop the spread of diseases that could affect humans
 - AI No 34 Controlling wildlife populations by killing
 - AI No 35 Controlling animal populations by sterilisation
 - AL No 36 Destroying the habitat of endangered animal species
 - AL No 37 Destroying the habitat of non-endangered animal species to develop and promote urbanisation or crops to feed humans
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Appendix I (cont)

Theme 8: Societal attitudes towards animals

AI No 38 Sacrifice of animals in religious rites

AI No 39 Considering some animal species as sacred or good luck symbols or totems

AI No 40 Considering some animal species as evil or bad luck

AI No 41 Parents displaying cruel treatment of animals in front of their children

AI No 42 Inflicting pain or injury on animals as part of cultural traditions

AI No 43 Cloning animals for human benefit
