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# International perceptions of animals and the importance of their welfare

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Our perceptions shape our intentions, our motivations, our behavior, and in doing so, our reality. In this age of the Anthropocene, our perceptions also impact the lives and welfare of other animals. One of the key principles associated with the success of international animal welfare initiatives is an understanding of local audiences and contexts. Additionally, culture by country has been demonstrated to be a significant determinant of attitudes to animals and their welfare. Within this study, we surveyed 4,291 members of the general public on their perceptions of animals and animal welfare across 14 geographically and culturally diverse countries; Australia, Bangladesh, Brazil, Chile, China, India, Malaysia, Nigeria, Pakistan, Philippines, Sudan, Thailand, United Kingdom and United States. For many countries included in this study, this constitutes the first time research of this nature has been conducted. Most participants across all countries agreed that the welfare of both farmed animals and companion animals was important to them, and that laws that protect that welfare were also important. The notion that humans always care more for companion animals in comparison to farmed animals is challenged, as is the notion that care for the welfare of animals is a trademark of highly developed nations alone. It is proposed that the utility of the animals, and proximity by way of exposure are more significant than companionship in some countries,

particularly those that are engaged with subsistence farming. Important differences exist by country, and the findings have been presented within the context of each country, for ease of incorporation into localized strategy where suitable.

#### KEYWORDS

animals, welfare, international, cross-cultural, perceptions, general public, survey, attitudes

## Introduction

Perceptions are important. They shape our intentions, motivations and behavior (Ajzen and Fishbein, 1975; Varki and Colgate, 2001; Liñán, 2008; Green et al., 2012). Perceptions shape the way we perform in schools (Lan and Lanthier, 2003; Ferreira and Santoso, 2008; Mayers, 2021), how we engage with market products (Ha and Perks, 2005; Tekin et al., 2016; Sroka, 2020), how we eat (Mooney et al., 1994; Grunert, 2002), how we travel (Cohen et al., 2014), and how we utilize health care (Webb et al., 2010). In the age of the Anthropocene, human perceptions have direct implications in shaping our realities, and the realities of other species too (Kellert, 1983; Kellert, 1993). The farming systems and practices that humans subject animals to, the protection we afford them in laboratories, on the streets, in the wild and in our homes is all critically impacted by our perception of those animals, and our evaluation of the importance of their welfare. By way of illustration, we can consider the ubiquitous rat (*Rattus rattus* and *Rattus norvegicus*). Found in abundance on every continent, rats are perceived as pests, pets, laboratory subjects, wild animals, and in some geo-political regions, vestiges of spirituality and auspicious predictions (Puckett and Munshi-South, 2019). According to the context they are viewed within, rats will experience varied human interaction and level of legislative protection ranging from purposeful extermination using methods that cause extensive suffering to careful care as a pet and even reverential worship and servitude. As demonstrated by the rat, welfare realities experienced by the same species, with the same physiological and psychological needs regardless of context, are shaped by human perceptions, rather than a scientific foundation of understanding.

The impacts of human perception also hold implications across species. Giant panda (*Ailuropoda melanoleuca*), jaguar (*Panthera onca*), polar bears (*Ursus maritimus*) and wolves (*Canis lupus*) appear on magazine covers (Clucas et al., 2008) and are the subject of intensive fundraising activities, while many other species considered far more ecologically significant or critically vulnerable are readily resigned to extinction (Dang, 2017). While the availability of existing scientific literature

focused on species is a factor behind conservation policy bias, researchers have now effectively demonstrated that ‘societal preference’ for a species is the primary driver in conservation biases, with neglected species perceived as less charismatic or ‘cute’ by the public (Gunnthorsdottir, 2001; Martín-López et al., 2009; Colléony et al., 2017; Troudet et al., 2017). The variability of human perception by the ‘context’ in which the animal is found and the charisma built around it would also explain why U.S American study participants reported more concern for the welfare of bison, as opposed to fellow bovine species in the beef and dairy industry (Byrd et al., 2017). As illustrated by these examples, understanding human perceptions of other species should play a critical role in the development of strategy and real-world policy aimed at protecting and improving the quality of life for these species.

Human perceptions of non-human animals and the resulting interactions and choices we make relating to their worth and welfare is shaped by a variety of factors, including age, gender, religion and past experience with animals (see review by Cornish et al., 2016), and a potential perceived difference in sentience between traditional companion and farm animal species (Levine et al., 2005). One incredibly formative factor is the geo-political region and accompanying culture into which we are enculturated (Lawrence, 1985). Culture – the software we load into our minds from a young age - determines the framework with which we evaluate and behave in the world around us (Hofstede et al., 2010). Echoing findings in other key areas of international development, not enough attention in international animal welfare is paid to understanding the local socio-cultural perceptions prior to program implementation (Launiala and Kulmala, 2006; Sinclair and Phillips, 2018). Given the real world impact our perceptions have on other animals and the significance our culture has on those perceptions (Kellert, 1993; Phillips et al., 2012; Sinclair and Phillips, 2017; Sinclair et al., 2017a), cross-cultural research to better understand these perspectives provides directly applicable insight for developmental initiatives in international animal welfare.

Despite the formative nature of culture and the significant correlation it has to attitudes and perceptions of animals, research about this correlation is rarely conducted across

multiple cultures and country regions (Sinclair, 2020). In some regions, such as Europe, surveys of the general public are conducted frequently on many issues including attitudes towards animal welfare (European Commission, Directorate-General for Health and Food Safety, 2016) and the findings are used for country comparisons, to gauge trends, and also become incorporated into policy discussions. Outside of Europe, however, such as in Australia and the Americas, most research of this nature has been conducted with convenience sampling populations that are more readily accessible – such as university students. Although these are useful insights, the findings are subject to inherent biases and are representative only of that specific subset of the national population. One recent exception to this was an attitudinal instrument that successfully sampled 5,218 members of the general public in Brazil, Russia, India, China and the United States of America (Anderson and Tyler, 2018) on their attitudes to farmed animals. In presenting findings that further demonstrate differences by country, this study again reinforced the importance in continuing to recognize and understand perspectives as they differ around the world.

In recognition of the importance of understanding human perceptions by culture, the present study seeks to investigate general attitudes towards, and basic knowledge of, animals and their welfare in varied human contexts, across species, by culture. The main focus of this study is to investigate the general perceptions of companion and farmed animals and their welfare and to analyze the impact of cultural differences on this issue. Special attention will also be dedicated to perceptions regarding the experiences (physical and psychological suffering) in the two species farmed and consumed around the world in the largest numbers – chickens and fish.

It is anticipated that findings in this study could be of strategic use in the identification of opportunities for public education, policy development, market and international trade relationship development, and in the development of animal protection initiatives of increased efficacy. The results are presented in terms of core perceptions, the associated importance of animal welfare by specific species in the countries and then perceptions pertaining to animal welfare related experiences of two key farmed species, namely chicken and fish. We then present a general discussion as to the cross-cultural findings, and then discuss key findings by country.

## Method

### Research ethics

This research was granted ethical approval through the University of Queensland in Australia (2020002752). Data collection was conducted between April and October 2021. Due to the active COVID-19 pandemic, additional precautions

were taken, and some regional variations in data collections methods were required.

### Research tool

A survey was hosted online on the Google Forms platform and consisted of 24 items and four demographic questions (identified gender, age group, education level and religion) (Supplementary File) Before commencement, potential participants were presented with a statement of consent and continuation with the study required consent to be obtained (verbally or physically by clicking the box). Participants were first asked if they understood the meaning of ‘animal welfare’, after which the following definition was provided:

*“The welfare of animals refers to how well an animal is coping with the conditions in which it lives. An animal has good welfare if its needs are being met and hence it is healthy, comfortable, well nourished, safe, able to express important behavior and not suffering from unpleasant states such as pain, fear and distress”* -adapted from World Organization for Animal Health (OIE, 2016).

The 24 research items were designed to reveal participants’ knowledge and perceptions and consisted of a range of question styles. Some animal welfare related statements required the participant to attribute a level of agreement utilizing a 7-point Likert scale (1 – strongly disagree, 4 – neither agree nor disagree, 7 – strongly agree), or a level of importance to the welfare of various species (1 – extremely unimportant, 4 – I don’t have an opinion/don’t know the species, 7 – extremely important). All research items were pilot tested and revised with research team consultation to ensure they could be clearly translated and were appropriate within each of the countries where the study was being conducted. As a result of this consultation some alterations were made to the research tool, to enable the identical question to be used across all countries. One example of this was in question 3 (see Supplementary File), where ‘animal welfare friendly products’ was replaced with ‘products kinder to animals’, as some countries do not have a concept of the former (largely due to availability). In the versions that were completed by individuals at home facilitated through Mechanical Turk and Instagram (see 2.3 Data collection for full description of methods), the research tool included the addition of a “mid-way attention tool” to assess that participants were answering accurately, and not randomly clicking. Once programmed online in English, the survey tool was replicated for each of the countries, and translated by bilingual translators in-country into other languages as suitable to each general population as follows; Australia (English), Bangladesh (Bengali), Brazil (Portuguese), Chile (Spanish), China (Traditional Chinese/Mandarin), India (Hindi and English), Malaysia (Bahasa Malay, Chinese and English), Nigeria (English), Pakistan (Urdu), Philippines (English), Sudan (Arabic) and Thailand (Thai).

## Data collection

The main method of data collection in this study was face-to-face-collection in public spaces. Data collectors in each country were instructed and supervised by local research familiar 'Country Collaborators', who are also co-authors of this study. Once randomly selected and approached by data collectors, prospective participants were asked if they were willing to complete a five minute survey of opinions about animals for an international academic study. If the request was accepted, the data collectors ensured the participants were over 18 and that they identified themselves as residents of the country they were in. If they did not fulfill the required criteria they were thanked for their time and collection was ceased. If they did fulfill the criteria and agreed to participate, they were advised of the confidential and anonymous nature of the research, and advised that they could cease their involvement at any time during the survey. In this method of face-to-face collection, the data collectors then verbally presented each question to the participants and entered the response into the online survey tool where it was anonymously stored. While this method of collection was highly demanding of human resources, it was adopted in an attempt to reduce the bias of self-selection of animal-leaning participants. As with all methods of data collection, however, face-to-face methods of collection do carry the risk of other bias. In this instance it is important to acknowledge the 'enumerator effect', whereby the behavior or characteristics of the researcher approaching the respondent impacts both the likelihood to engage with the research, and in the responses they may give (Di Maio and Fiala, 2020). The eleven countries in which this face-to-face method was used were Australia, Bangladesh, Chile, The People's Republic of China (henceforth China), India, Malaysia, Nigeria, Pakistan, Philippines, Sudan and Thailand.

In addition to random approach in public spaces, in some countries it was necessary to adopt additional methods of recruitment, to ensure sufficient numbers, that presented reduced safety risk during periods of pandemic lockdown. In Malaysia and Australia, a QR code pamphlet that linked to the survey tool in was randomly given to members of the public with a brief explanation of the study so that they could complete the survey without being in close proximity to the data collector.

Recruitment of participants in Brazil, United States (henceforth USA) and United Kingdom (henceforth UK) was conducted entirely online. Recruitment in Brazil was conducted utilizing the social media platform Instagram (Meta Platforms et al., 2010) An advertisement (in Portuguese) saying "We want to hear from you. Access the link to collaborate with our research on the relationship between people and animals" was posted inviting the public to participate in the survey. The Instagram account was created exclusively to share the questionnaire and had no information on the identity of the authors or the research group. We strategically targeted participants to match the age

and gender distribution of the Brazilian population and the questionnaire was initially pilot tested using 20 randomly recruited participants to ensure representative distribution was achieved. Participant recruitment for data collection in the USA and the UK was conducted utilizing online platform Amazon Mechanical Turk (Bezos, 2005). Amazon Mechanical Turk offers a small payment (in this study, a scaled proportion of minimum salary for five minutes of participation time) to 'workers' previously enlisted with the platform in exchange for completing the survey. Amazon Mechanical Turk has been previously validated as a survey participant recruitment tool (Robbins et al., 2016), with samples providing more diversity with comparable quality measured against standard samples (Paolacci and Chandler, 2014).

## Data analysis

The data were initially collated, organized and cleansed by removing incomplete datasets and all data from participants that did not pass the midway attention test (see 2.2 Research tool). Data were imported into Microsoft SQL Server and Microsoft Excel for cleaning, and IBM SPSS and Minitab (Minitab Statistical Software LLC, 1972) where descriptive statistics were obtained for the demographics and research items. Based on the Likert scale (1-7), all attitudinal questions were assessed for means to approximate magnitude of agreement for statement items, or associated importance for species specific animal welfare perceptions (Norman, 2010). Variance between countries for each question was assessed with a one-way ANOVA, with a *post hoc* Tukey pairwise analysis test performed to assess homogeneity between countries, where means of question responses or groups were compared, a Student's t-test was used. Percentages of agreement were calculated by identifying and quantifying the number of participants who expressed some level of agreement (5, 6 or 7 values), against those who expressed disagreement (1, 2 or 3 values) or neutrality (4 value). Both calculations are presented together in results tables to build a picture of general agreement/associated importance, and strength of that agreement/associated importance.

## Results

### Participants

A total of 4,291 participants engaged in this study, across 14 geographically and culturally diverse countries (Australia, Bangladesh, Brazil, Chile, China, India, Malaysia, Nigeria, Pakistan, Philippines, Sudan, Thailand, UK and USA). Demographic distribution within these countries is presented in Table 1. Although distribution varies across countries, the total sample was closely split by gender (49.55% were male,

TABLE 1 Demographic characteristics of respondents (n = 4,291) in Australia, Bangladesh, Brazil, Chile, China, India, Malaysia, Nigeria, Pakistan, Philippines, Sudan, Thailand, United Kingdom and United States.

## Respondents, n (% of total responses within country)

	Australia		Bangladesh		Brazil		Chile		China		India		Malaysia		Nigeria		Pakistan		Philippines		Sudan		Thailand		United Kingdom		United States		Totalmean
<b>TOTAL</b>	<b>250</b>		<b>286</b>		<b>302</b>		<b>252</b>		<b>249</b>		<b>455</b>		<b>262</b>		<b>298</b>		<b>501</b>		<b>309</b>		<b>327</b>		<b>255</b>		<b>254</b>		<b>291</b>		<b>4,291</b>
<b>Gender</b>																													
Male	76	30.4%	182	63.6%	143	47.4%	87	34.5%	130	52.2%	210	46.2%	75	28.6%	173	58.1%	341	68.0%	83	26.9%	247	75.5%	93	36.5%	161	63.4%	191	65.6%	49.8%
Female	171	68.4%	102	35.7%	154	51.0%	159	63.1%	114	45.8%	231	50.8%	180	68.7%	118	39.6%	157	31.3%	204	66.0%	65	19.9%	157	61.6%	89	35.0%	97	33.3%	47.9%
Prefer not to say	3	1.2%	2	0.7%	5	1.7%	6	2.4%	5	2.0%	14	3.1%	7	2.7%	7	2.3%	3	0.6%	22	7.1%	15	4.6%	5	2.0%	4	1.6%	3	1.0%	2.4%
<b>Education level</b>																													
None			41	14.3%							9	2.0%	2	0.8%			112	22.4%	1	0.3%	5	1.5%			2	0.8%	2	0.7%	5.3%
Primary school	3	1.2%	40	14.0%	2	0.7%	3	1.2%	2	0.8%	12	2.6%			4	1.3%	111	22.2%	3	1.0%	7	2.1%				2	0.7%	4.3%	
Secondary school	43	17.2%	74	25.9%	26	8.6%	47	18.7%	8	3.2%	61	13.4%	29	11.1%	30	10.1%	97	19.4%	27	8.7%	12	3.7%	9	3.5%	28	11.0%	24	8.2%	11.6%
Vocational course	60	24.0%	50	17.5%	37	12.3%	24	9.5%	27	10.8%	49	10.8%	51	19.5%	35	11.7%	42	8.4%	38	12.3%	24	7.3%	18	7.1%	55	21.7%	69	23.6%	14.0%
University	144	57.6%	78	27.3%	237	78.5%	177	70.2%	212	85.1%	316	69.5%	179	68.3%	229	76.8%	137	27.3%	239	77.3%	277	84.7%	226	88.6%	168	66.1%	194	66.8%	67.4%
Undisclosed			3	1.0%			1	0.4%			8	1.8%	1	0.4%			2	0.4%	1	0.3%	2	0.6%	2	0.8%	1	0.4%			0.6%
<b>Age group</b>																													
18-29	90	36.0%	94	32.9%	58	19.2%	156	61.9%	159	63.9%	233	51.2%	46	17.6%	154	51.7%	194	38.7%	113	36.6%	139	42.5%	38	14.9%	92	36.2%	58	20.2%	37.4%
30-39	62	24.8%	93	32.5%	61	20.2%	42	16.7%	69	27.7%	104	22.9%	99	37.8%	75	25.2%	125	25.0%	107	34.6%	98	30.0%	107	42.0%	90	35.4%	114	39.0%	29.6%
40-49	33	13.2%	53	18.5%	74	24.5%	16	6.3%	11	4.4%	81	17.8%	77	29.4%	44	14.8%	92	18.4%	54	17.5%	52	15.9%	56	22.0%	38	15.0%	68	23.3%	17.2%
50-59	37	14.8%	27	9.4%	68	22.5%	17	6.7%	7	2.8%	15	3.3%	25	9.5%	23	7.7%	67	13.4%	28	9.1%	29	8.9%	44	17.3%	22	8.7%	33	11.3%	10.4%
60+	28	11.2%	18	6.3%	41	13.6%	21	8.3%	3	1.2%	14	3.1%	14	5.3%	2	0.7%	23	4.6%	7	2.3%	7	2.1%	9	3.5%	12	4.7%	18	6.2%	5.2%
Undisclosed			1	0.3%							8	1.8%	1	0.4%							2	0.6%	1	0.4%					0.70%
<b>Religion</b>																													
None	175	70.0%			94	31.1%	118	46.8%	211	84.7%	30	6.6%	24	9.2%	3	1.0%			10	3.2%	7	2.1%	5	2.0%	136	53.5%	35	12.0%	26.8%
Buddhism	1	0.4%			2	0.7%			21	8.4%	6	1.3%	84	32.1%					1	0.3%	1	0.3%	238	93.3%	1	0.4%			15.2%
Catholicism	13	5.2%			83	27.5%	89	35.3%	1	0.4%	3	0.7%	7	2.7%	2	0.7%			194	62.8%			1	0.4%	10	3.9%	41	14.4%	14.00%
Christianity	43	17.2%			70	23.2%	28	11.1%	8	3.2%	2	0.4%	37	14.1%	237	79.5%	3	0.6%	93	30.1%			4	1.6%	78	30.7%	184	63.0%	22.9%
Hinduism			25	9.7%							392	86.2%	11	4.2%			1	0.2%			5	1.5%			10	3.9%	3	1.0%	0.15%
Islam	2	0.8%	260	90.9%	1	0.3%			2	0.8%	2	0.4%	85	32.4%	52	17.4%	494	98.6%	2	0.6%	305	93.3%	7	2.7%	8	3.1%	4	1.4%	26.7%
Taoism	1	0.4%							3	1.2%			5	1.9%											2	0.8%			1.1%
Other	15	6.0%	1	0.3%	52	17.2%	17	6.7%	3	1.2%	17	3.7%	8	3.0%	4	1.3%			7	2.3%	9	2.8%			9	3.54%	24	8.2%	4.7%
Undisclosed											3	0.7%	1	0.3%			3	0.6%	2	0.6%									0.5%

Note: Where less than 10 participants across all countries denoted adhering to a specific religion, the data was included into 'other'. This includes Jainism, Judaism, Sikhism, Chinese Folk Religion, Confucianism and Bahai Faith.

47.89% were female). Most participants were between 18 and 49 years of age. Participants with a university education are overrepresented as compared to the general population, however this is a consistent effect across countries.

## Core perceptions

Across all countries, 73.7% of participants said they understood the meaning of ‘animal welfare’ (Figure 1), 20.4% understood ‘some’ and 5.7% did not understand the meaning. Participants from the USA (95.2%), UK (90.1%), Philippines (86.4%), Sudan (85.3%), India (84%) and Australia (83.6%) state they understood the concept with the most frequency. Participants from China (30.1%), Bangladesh (16.4%), Malaysia (8.4%), Nigeria (7.4%) and Pakistan (6%) stated that they did not understand ‘animal welfare’ with the most frequency.

Most participants (86.8%) agreed that the welfare of *farmed* animals in their country was important to them (Table 2), with a statistically significant difference for level of agreement between countries as determined by a one-way ANOVA ( $F_{13,4278} = 14.880$ ,  $p < 0.001$ ). Chile (96.8%), Pakistan (95.2%), Australia (91.2%) and Brazil (90.2%) had the highest relative levels of agreement and no significant difference between the strongest supporters Chile and Brazil ( $P=0.53$ ). Similarly, 87.6% of participants agreed that the welfare of *companion* animals in their country was important to them with a positive correlation between responses to the two questions when analyzed using a paired sample t-test (Correlation=0.662,  $P<0.001$ ,  $N=4291$ ), with an increase in mean level of agreement of 0.9% compared with

the same question about farmed animals. Chile (99.2%), Australia (94.4%), Brazil (94%) India (91.8%), Pakistan (92.4%), Thailand (91.3%) and the UK (90.9%) had the highest percentage of general agreement, the strength of agreement was highest in Chile, Brazil and Australia, with no significant difference between those countries ( $P=0.162$ ). The largest differences in perceived importance of welfare between *farmed* animals and *companion* animals existed in India, where *companion* animals were approximately 7% more frequently perceived as important compared with *farmed* animals, but the change in strength of this agreement was highest in Thailand and high in Australia. Brazil and Chile. In some countries, the welfare of *farmed* animals was perceived as more important than that of *companion* animals, most notably Bangladesh and Sudan, with approximately 10% difference in both instances and the strongest change in disagreement for Sudan. There was no statistical difference in strength of change in agreement between Sudan and Bangladesh ( $P=1$ ). Pakistan and Nigeria also attributed more importance to farmed animals over companion animals but to a lesser degree (Table 2).

Most participants stated they would pay more for products kinder to animals (82.2%), with participants in Chile (97.2%), Australia (91.6%) and Brazil (89.7%) agreeing most frequently and most strongly. The lowest levels of agreement towards this statement were still considerably high in most instances (except Bangladesh, 52.7%, which had a significantly lower level of agreement strength than all other countries. Other low agreement countries were Nigeria (70.4%), and Sudan (75.8%) with the strength of these countries’ level of agreement not significantly different from USA (81%). Overall there was a correlation between perceived importance of farmed animal

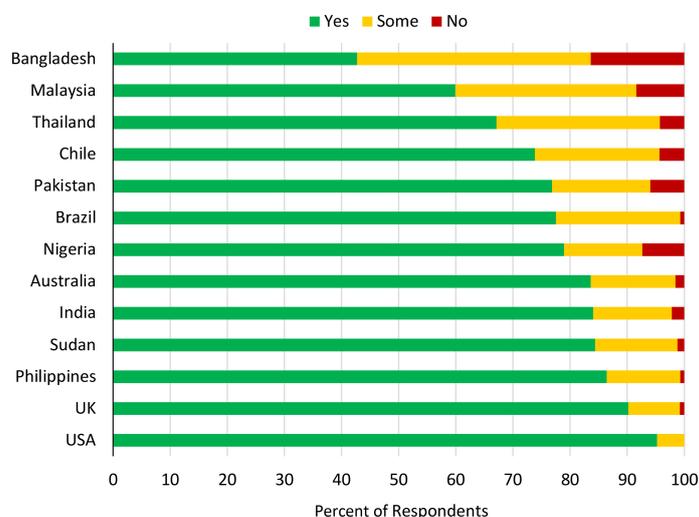


FIGURE 1 Responses to ‘I understand what animal welfare means’ in percentages, by country, ranked in ascending order of full understanding.

**TABLE 2** Means for the level of agreement with animal welfare statements by country, utilizing 7-point Likert scale, and percentage of general agreement with statement.

	<i>The welfare of farmed animals in &lt;country&gt; is important to me</i>			<i>The welfare of companion animals in &lt;country&gt; is important to me</i>			<i>If I could afford it, I would pay more to buy products that are kinder to animals</i>		<i>I think it is important to have laws that protects the welfare of animals in &lt;country&gt;</i>	
	%	Mean	SD	%	Mean	SD	%	Mean	%	Mean
Australia	91.2%	6.22	1.265	94.4%	6.56	1.029	91.6%	6.38	95.6%	6.59
Bangladesh	82.5%	5.61	1.129	72.3%	5.17	1.415	52.7%	4.45	78.3%	5.49
Brazil	90.2%	6.35	1.074	94.0%	6.60	0.922	89.7%	6.24	94.0%	6.57
Chile	96.8%	6.61	0.823	99.2%	6.87	0.455	97.2%	6.68	98.4%	6.86
China	81.5%	5.63	1.279	83.1%	5.81	1.348	83.5%	5.70	86.3%	5.94
India	85.0%	5.97	1.463	91.8%	6.18	1.350	83.0%	5.76	86.1%	6.16
Malaysia	85.4%	5.83	1.267	89.6%	6.07	1.191	83.5%	5.77	90.0%	6.160
Nigeria	77.8%	5.69	1.563	76.1%	5.61	1.646	70.4%	5.36	83.2%	5.91
Pakistan	95.2%	6.04	0.981	92.4%	6.02	1.132	86.6%	5.68	94.8%	6.21
Philippines	87.7%	6.16	1.402	89.3%	6.26	1.396	85.7%	5.99	89.0%	6.33
Sudan	85.0%	5.91	1.587	74.9%	5.36	1.868	75.8%	5.44	82.8%	5.92
Thailand	83.0%	5.80	1.292	91.3%	6.26	1.210	84.6%	5.85	90.5%	6.29
United Kingdom	88.6%	5.75	1.172	90.9%	6.08	1.159	86.2%	5.97	91.7%	6.27
United States	86.5%	5.68	1.219	86.9%	5.89	1.225	81.0%	5.64	83.8%	5.79
International aggregate	86.89%	5.94	1.298	87.59%	6.05	1.360	82.25%	5.77	88.89%	6.17

1-strongly disagree, 2 – somewhat disagree, 3 – disagree, 4 – neither agree nor disagree, 5 – somewhat agree, 6 – agree and 7 – strongly agree.

welfare and willingness to pay more for kinder animal products ( $R=0.620$ ,  $P<0.001$ ,  $N=4291$ ). In some countries, however, a considerable difference existed: Bangladesh, Sudan, Pakistan and Nigeria (29.8%, 9.2%, 8.6% and 7.4% difference in general agreement respectively).

Most participants agreed that it was important to have laws that protect the welfare of animals in their country (aggregate of 88.9%). Lowest agreement was still high, at 78.3% in Bangladesh, and highest agreement was again in Chile (98.4%) and Australia (95.6%), followed by Pakistan (94.8%), Brazil (94%) and the UK (91.7%). See [Table 2](#).

## 'Importance' of animal welfare by species

In general, the welfare of each species assessed in this study were deemed to be important, to some level. The few exceptions to this include dogs and pigs in Pakistan, and soft-shelled turtle, kangaroo and koala in Bangladesh, Nigeria, Pakistan and Sudan, where mean importance was 'neither agree or disagree' (4) or below (2 and 3) into levels of disagreement (see [Table 3](#)).

In all instances (except Australia, Chile and Brazil), the welfare of humans was considered the most important of the assessed species. In Australia, Chile and Brazil, the welfare of dogs was deemed more important than humans, in Chile the welfare of cattle was also ranked higher than that of humans, and the welfare of koalas was deemed more important than humans

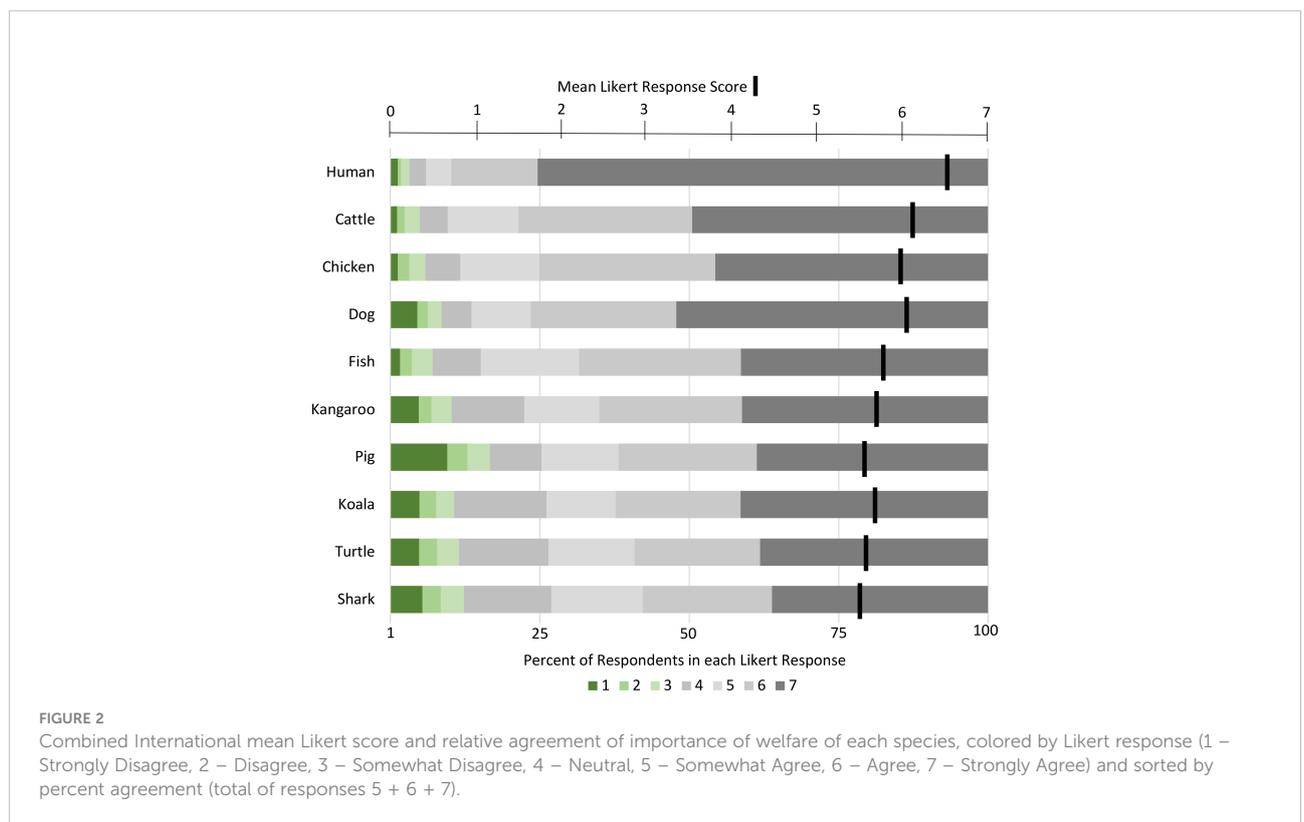
in Australia and Chile. By way of aggregate, species in order of the importance of their welfare are humans, cattle, dogs, chickens, fish, kangaroo, koala, soft-shelled turtle, and lastly, pigs (see [Figure 2](#)). Large disparity exists between countries, however, and therefore rankings by country are presented in [Figure 3](#). The difference between the perceived importance of human and dog welfare was correlated with the United Nations Human Development Index ( $R^2 = 0.372$ ,  $SE=0.34$ ,  $P=0.027$ ), indicating that higher developed countries see less difference between humans and dogs, as opposed to those in lesser developed countries (see [Figure 4](#) and [Table 4](#)). Pakistan was removed from this analysis as it was a significant outlier, see section 4.1 below.

## The experiences of other species: chicken and fish

To varying degrees across countries, participants generally agreed that chickens and fish both feel pain (79.3% and 78% respectively) with a positive correlation between chicken pain and fish pain according to a pairwise t-test (Correlation 0.67,  $P<0.001$ ,  $N=4291$ ), that chickens feel emotions (71.4%), and that chickens need room to explore (73.5%) (see [Table 5](#)). While still generally in agreement, when asked if fish experience emotions, however, agreement levels were lower (61.5%). With the exception of participants in Thailand, who stated with

TABLE 3 for the level of importance attributed to the welfare of specific species, by country.

	Human animals	Companion animals Dogs	Frequently farmed animals					Mostly wild animals	
			Cattle	Pigs	Chickens	Fish	Soft-shelled turtle	Kangaroo	Koala
Australia	6.62	6.70	6.49	6.52	6.46	6.19	6.48	6.53	6.63
Bangladesh	6.70	5.72	6.09	5.05	5.88	5.51	4.83	4.94	4.65
Brazil	6.64	6.72	6.59	6.56	6.49	6.31	6.53	6.55	6.56
Chile	6.60	6.89	6.62	6.46	6.51	6.35	6.57	6.57	6.65
China	6.74	6.13	5.82	5.67	5.49	5.24	5.24	5.81	5.81
India	6.32	6.17	6.14	5.70	5.74	5.75	5.74	5.94	5.83
Malaysia	6.58	6.19	5.89	5.66	5.76	5.62	5.79	5.99	6.04
Nigeria	6.62	5.93	5.97	5.65	6.03	5.80	4.87	4.97	4.85
Pakistan	6.54	4.15	6.27	2.33	6.28	6.12	3.72	3.90	3.63
Philippines	6.61	6.47	6.14	6.15	6.05	5.95	6.14	6.20	6.26
Sudan	6.19	5.11	5.50	4.19	5.62	5.47	4.63	4.83	4.62
Thailand	6.72	6.41	6.19	6.11	6.00	5.88	5.86	6.20	6.20
United Kingdom	6.64	6.39	6.05	6.01	5.93	5.74	5.98	6.07	6.05
United States	6.08	5.98	5.53	5.54	5.51	5.39	5.46	5.64	5.54



significantly ( $P < 0.01$ ) higher percentage and strength of agreement that fish feel emotions (85.8%, Mean=6.03, SD=1.22, SE=0.0764), this dynamic of attributing emotions more readily to chickens than fish was fairly consistent in mean difference across countries. While chickens were slightly more frequently perceived to feel pain compared with fish across all countries, the difference between the two was most noticeable

in Nigeria and Sudan, with a difference of 13.7% and 12.2% respectively (in favor of chickens).

In considering emotions, participants in all countries were less likely to agree that fish experience emotions compared with chickens. While the aggregate difference in ability to feel pain across the species was only 1.3%, the aggregate difference in regard to emotions was almost 10%. The lowest difference in

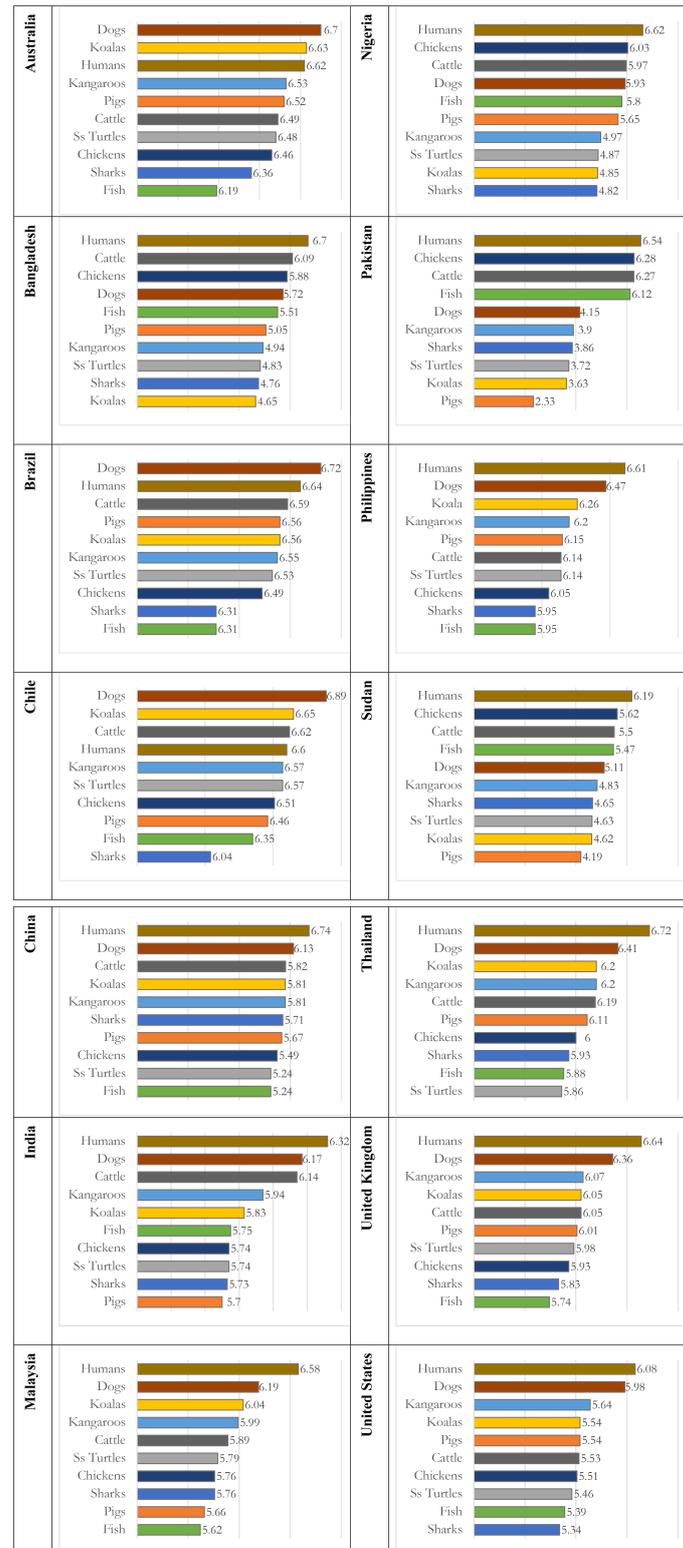


FIGURE 3 Means ranking of considered importance of the welfare of specific species, by country, according to 7-point Likert scale.

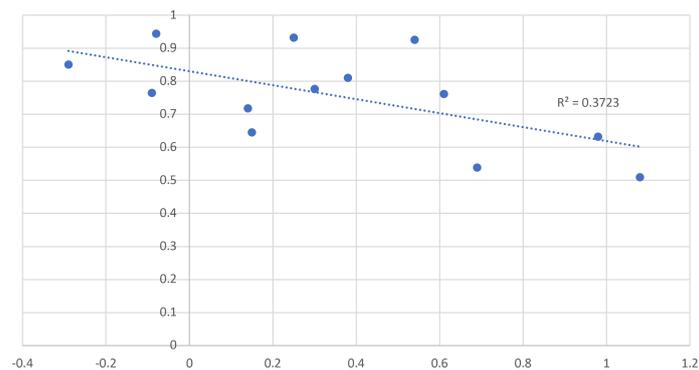


FIGURE 4

Scatter plot chart in which each datapoint is a country, modelling association of importance of welfare with United Nations Development ranking. Pakistan as an outlier has been removed from this chart due to the religious influence on the perception of this species (dog).

perceived emotional capacity across the two species existed in India, and most notably Thailand, with very small disparities of 6.8% and 1.2% respectively (see Table 5).

In terms of space to explore and exercise for chickens, most participants agreed to some level that it is needed. The highest levels of agreement, again, came from Chile (96.4%), Brazil (96.4%), Australia (95.6%), and the UK (90.5%). Although acknowledging the need for space, participants from these same countries comparatively agreed to a lesser extent that chickens have emotions.

In terms of general agreement across the section (Q6-10; can chickens and fish feel pain, emotions and need space), participants in Australia (Mean=6.2, SD=1.01, SE=0.064) had the highest mean agreement levels, followed by Chile, Thailand and Brazil and there was no statistical difference in the responses between these countries determined by a one-way ANOVA

TABLE 4 United Nations Human Development Report 2020 Ranking and HDI score of countries included in this study.

Country	Rank	HDI
Australia	8	0.944
UK	13	0.932
USA	17	0.926
Chile	43	0.851
Malaysia	62	0.81
Thailand	79	0.777
Brazil	84	0.765
China	85	0.761
Philippines	107	0.718
India	131	0.645
Bangladesh	133	0.632
Pakistan	154	0.557
Nigeria	161	0.539
Sudan	170	0.51

( $F_{13,4278} = 19.11$ ,  $P < 0.001$ ) and *post hoc* Tukey pairwise analysis ( $P = 0.971$ ). Participants in Sudan had the lowest agreement levels, followed by USA, Nigeria, India, Bangladesh and then Pakistan, again with no significant difference between their responses ( $P = 0.06$ ) (see Table 5).

## Discussion

### Cross-cultural general discussion

The findings of this research optimistically show that most participants across all countries agreed that the welfare of both farmed animals and companion animals was important, and that laws that protect that welfare were also important. This echoes previous findings, in which participants in Brazil, Russia, India, China and the USA wanted better welfare for animals (Anderson and Tyler, 2018), and another study in which geographically distributed participants in Czech Republic, China, Iran, Ireland, Korea, Portugal, Macedonia, Norway, Serbia, Spain, Sweden and the UK, ranked 'animal protection' as one of the most important world social issues (Sinclair and Phillips, 2017). Also consistent with previous research, participants in most countries considered welfare more important for companion animals than farmed animals (Rioja-Lang et al, 2020). Importantly, however, in four countries this opinion was reversed. We propose three possible explanations for why participants in Bangladesh, Pakistan, Nigeria and Sudan considered the welfare of farmed animals more important than companion animals:

(1) The impact of *religion* on cultural perceptions; Islam is the dominant religion in each of the countries, with 90%+ of participants in Bangladesh, Pakistan and Sudan identifying as Muslim, and over 50% of the general population of Nigerians identify as Muslim (Harvard Divinity School, 2022). Islamic

TABLE 5 Means for the level of agreement with species specific experiential statements, by country utilizing 7-point Likert scale, and percentage of general agreement with statement.

	<i>Chickens can feel pain</i>		<i>Chickens can experience emotion</i>		<i>Chickens needs room to explore and exercise</i>		<i>Fish can feel pain</i>		<i>Fish experience emotions</i>	
	%*	Mean	%	Mean	%	Mean	%	Mean	%	Mean
Australia	96.4%	6.36	84.8%	6.06	95.6%	6.62	86.8%	6.24	71.6%	5.50
Bangladesh	97.9%	6.33	75.1%	5.36	79.7%	5.41	94.7%	5.99	66.4%	4.95
Brazil	92.0%	6.53	79.1%	5.78	94.0%	6.54	85.7%	6.18	65.5%	5.29
Chile	96.8%	6.76	79.7%	5.82	96.4%	6.71	86.5%	6.34	65.4%	5.37
China	91.1%	6.11	85.1%	5.89	88.3%	6.00	82.7%	5.80	74.2%	5.38
India	87.2%	6.05	78.0%	5.57	62.4%	5.06	84.8%	5.94	75.2%	5.38
Malaysia	87.4%	6.14	74.8%	5.58	85.1%	5.91	78.6%	5.66	65.6%	5.26
Nigeria	89.2%	6.09	71.8%	5.32	79.1%	5.26	75.5%	5.56	60.0%	4.91
Pakistan	92.0%	5.98	82.8%	5.56	85.0%	5.61	87.4%	5.69	76.2%	5.35
Philippines	88.3%	6.12	77.3%	5.67	83.4%	5.86	82.2%	5.88	71.8%	5.45
Sudan	80.7%	5.66	73.0%	5.21	76.1%	5.47	68.5%	5.29	66.9%	5.01
Thailand	93.7%	6.44	88.5%	6.11	85.0%	5.85	89.7%	6.27	85.8%	6.02
United Kingdom	91.7%	6.27	75.1%	5.40	90.5%	6.13	83.0%	5.85	61.8%	4.84
United States	79.3%	5.70	71.4%	5.27	73.5%	5.35	78.0%	5.49	61.5%	4.90

% denotes the quantity of participants that agreed, to some level, with the statement (a Likert scale attribution of 5, 6 or 7). Mean is presented as an average of weighted responses in accordance with the 7-point Likert 'agreement' scale. 1-strongly disagree, 2 - somewhat disagree, 3 - disagree, 4 - neither agree nor disagree, 5 - somewhat agree, 6 - agree and 7 - strongly agree.

religious doctrine forbids the consumption of pigs for reasons of impurity of the species (Qur'an, 6:145), and likewise, Islamic tradition warns away from interaction with dogs (El Fadl, 2004). This was clearly reflected in our results, with participants of Islamic faith the least likely to agree that pig welfare was important (Mean=3.76, SD=2.22, N=1224) which was significantly different from all other faiths (except "undisclosed" and "Taoism" which had small sample sizes). Similarly with attitudes toward dog welfare, participants who identified as Islamic had the weakest support (Mean=4.94, SD=1.96, SE=0.056) which again was significantly different from all other faiths except "undisclosed" and Taoism (P<0.001). Determining agreement for pig and dog welfare by country, the impact of Islamic religious sentiment is supported - particularly in Pakistan where participant responses differed from the more common pro-welfare positions in that the welfare of both pigs and dogs was not considered important. Considering fellow Islamic majority country Malaysia did not have the same finding of reduced care for the welfare of dogs, the dynamic in which the welfare of farmed animals in general is deemed more important than that of companion animals in these nations may not only be a simple case of traditional Islamic aversion to dogs, rather integrally shaped by the culture in which Islam is present. To further demonstrate this, there was a significant difference in the strength of agreement between companion animal welfare and dog welfare for Pakistan (Mean(Diff)=1.87, SD=2.34, SE=0.10), however this isn't so clear for other countries of Islamic faith.

(2) *Proximity* to the animals may also contribute to the elevated consideration of farm animals. Unlike Malaysia, the

development level of the agricultural sector in each of these countries (e.g. the commonality of subsistence farming and high distribution of rural living) may mean participants are exposed to farmed animals more regularly and are therefore more familiar with them. It also means they have less opportunity to develop cognitive dissonance and are also in a position to develop an appreciation for species characteristics and individuals. This challenges the assumption that human affinity is always greater for companion animals. Instead, human affinity and concern for welfare may be greater where there is species proximity, familiarity, and opportunity to develop appreciation, respect, and even empathy for those animals. This may particularly be the case when the contact is with fewer animals who may even be identifiable by name.

(3) The final proposed explanation for the dynamic in which the welfare of farmed animals was deemed more important the *vital utility* of the animals (discussed further below).

These three possible explanations suggest that the use of religion alone to explain perceptions and behaviors towards animals is cautioned against, as consideration of culture and status of agricultural development may also play an important role. This is supported by literature that identifies country and geo-culture as more consistently and significantly correlated with animal attitudes, than religion or religiosity (Phillips et al., 2012; Sinclair and Phillips, 2017; Sinclair et al., 2019b).

Another finding of this study is that most participants agreed to some level that they would prefer to purchase products that were kinder to animals, should they be able to afford it. While some literature in Western nations has cautioned against using declared 'willingness to pay' as an indicator of actual consumer

purchasing behavior (Taylor and Signal, 2009), it is, however, a promising market indication. When assessing the mean differences between the allocated importance of farmed animal welfare and willingness to pay, responses appear aligned. Exceptions to this trend again appear in Bangladesh, Nigeria, Pakistan and Sudan, in which participants generally agreed that the welfare of farmed animals is important, however that they agree to a far lesser degree that they would pay more for products with higher welfare. Of the countries included in this study, these nations have the lowest ranking in the United Nations Human Development Index (United Nations Development Program, 2020); see Table 4. Considering this context, two explanations are proposed. Firstly, as a result of reduced affluence, participants in these countries may be less able to imagine themselves in a position in which they have the luxury of purchasing more expensive products. Secondly, perhaps the assumption that deeming the welfare of farmed animals as important is a personal ethical conviction that influences behaviors in all areas of life (including consumer behavior), is unsound. Given developmental status and the nature of rural life, animal welfare of farmed animals may have been deemed important by participants in these countries for reasons of *utility*. Aligned with the concept of ‘One Welfare’ (Pinillos et al., 2016), this draws attention to the direct connection between the wellbeing of livestock and community livelihood. More specifically, healthy animals are often more productive, yield higher product quality, reduce risk of mortality, require less expense associated with treatment of illness and injury (De Passillé and Rushen, 2005; Grandin, 2015; Grandin, 2020). This conclusion is supported by literature suggesting that humans often associate value to animals that are of instrumental value to them (Hills, 1993; Burns, 2017; Burns and Benz-Schwarzburg, 2021; Burns, 2022), or that animal matters to them personally (as opposed to the welfare of the animal mattering as it matters to that animal). This conclusion is also supported by research with livestock leaders across Asia in which they identify improved performance and product quality as key benefits for improving animal welfare (Sinclair et al., 2019a). Tied to this, it is also possible that the degree of maturity of animal welfare discussion in each country, alongside the presence of higher welfare labelled products across each society also feeds back into this, however this is yet to be investigated.

Participant responses in this study broadly align with understanding of human preferences and empathy for species according to their appearance. Previous psychological, behavioral and neurophysiological research suggests that humans are more often drawn to other animals that have similar phenotypical likeness to humans, are considered ‘cute’ by way of neonatal (infant-life) appearance, and beauty (i.e. – vibrant color) (Westbury and Neumann, 2008; Borgi and Cirulli, 2016; Estren, 2017). The increased concern for mammalian species demonstrated in this study suggests that fish and

chicken welfare initiatives may be more successful if they aimed to engaged the general public on platforms other than empathy for the animals themselves. Further research could be conducted to identify more compelling platforms in which to engage the general public into animal welfare initiatives that are country specific.

As humans are less readily able to forge empathetic relationships with taxonomically divergent species such as fish and chickens, perception changes could be supported by an understanding and appreciation for other aspects of the species. As understood scientifically, fish and chickens both experience pain (Underwood, 2002; Machin, 2005; Braithwaite and Boulcott, 2007). Echoing the findings of another recent study in Brazil, Canada, China, India and the USA (Wulderk et al., 2022), most participants in this study stated agreement with that sentiment. Another significant similarity across both studies is that participants across all countries were less likely to agree that fish feel pain compared to chickens (Wulderk et al., 2022). Being an aquatic species, fish not only look vastly different, but we also are rarely in proximity to fish species in their habitat, rendering observation and judgment of their experiences foreign to most people. In regard to psychological welfare, participants generally agreed that both chicken and fish experience emotions, although to a far lesser degree than other species. In all instances, participants also attributed the ability to experience emotions to fish far less frequently than chickens. The body of scientific evidence pertaining to the emotional lives of other animals is continuing to grow, however it is understood that both chickens and fish experience at least evolutionary emotions such as fear. Second to the ability to feel pain, participants were most likely to agree that chickens need room to explore and exercise. This finding was again supported by previous studies (Wulderk et al., 2022), and suggests that initiatives based on improving chicken welfare could focus on those themes. Agreement was highest in Australia, Brazil, Chile and the UK, where extensive ‘cage-free’ campaigns have been conducted. Agreement was also high in China, which could be related to a local preference for ‘naturalness’ of produce (Manzano et al., 2020). Despite having relatively high concern for animals, participants in India were the least likely to perceive that chickens needed room to explore, which was also a shared finding with the previous study, which measured the need for chicken and fish to explore. The reason for this finding from India is unknown to the authors and requires further research.

The commonality of pro-animal welfare perceptions across countries reported in this study challenges the anecdote that citizens residing in highly developed countries care more about animals and their welfare. Participants from lesser developed countries reported similar and, in the instance of some species, higher levels of care. The reason for associated importance of animal welfare, however, may differ. Proximity to and instrumental utility of some species (i.e. - dependence of livelihood) may result in more focus on animal welfare in

some regions. While participants in wealthier countries that sit high on the development index may have the luxury and opportunity to invest in causes for ethical reasons, it may come at the cost of proximity to the animals – and with it, increased likelihood of cognitive dissonance and decreased opportunity to develop the relationships and familiarity that mutual reliance forges in lesser developed countries. Likewise, those in countries higher on the Human Development Index may have the ‘luxury’ of associating higher importance with the welfare companion animals, who serve no direct utility in their livelihood or survival. This correlation is further demonstrated in the difference between human and dog welfare, with is generally greater in lesser developed countries (see [Figure 4](#)).

These findings have implications for policy, consideration for legal protections, and advice for animal welfare strategy. Where education is needed, and where certain species are held in high regard and their welfare deemed important, potential of engagement as ambassador species in an introduction to animal welfare exists.

The slowly growing body of literature in international animal welfare calls for locally tailored and led initiatives. Therefore, the key findings and applications of this study as they relate to the cultural context of each country are outlined in the following section (4.2 Key findings and applications by country).

## Key findings by country

### Australia

Participants from Australia had some of the highest levels of agreement around the importance of animal welfare across the study. Almost all participants (91.2%, and a mean of 6.22/7) agreed that the welfare of farmed animals was important. This is far higher than a previous study that reported 70% of respondents had neutral views about farm animals, only 10% were concerned for farm animal welfare, and 20% were anti-farm animal welfare ([Malek et al., 2017](#)). Some of this disparity could be explained in the participant demographics; meat eaters were overrepresented in the previous research, and vegetarians were overrepresented in our study (see Section 4.3), as compared to the general population, though Australians have rapidly reduced meat consumption since [Malek et al. \(2017\)](#) study.

Australians perceived the importance of dog and koala welfare as higher than humans. While surprising, this echoes findings in previous literature in which dogs were considered important in contemporary Indigenous Australian communities and a link was acknowledged between poor dog health and its negative effects on people’s lives ([Constable and Dixon, 2010](#)). Koala are an integral component of Australia’s identity, with strong anthropomorphic renderings and values that appear to have significantly contributed to their symbolic and materialistic value in Australia ([Markwell, 2021](#)), together with strong pro-

koala conservation perceptions amongst the population ([Fabian et al., 2020](#)). Conversely, while kangaroo also constitute an element of Australian identity, the species is frequently eaten and fed to pets, with public support for lethal wildlife management methods significantly higher for kangaroo than koala ([Boulet et al., 2021](#)).

### Bangladesh

Human-focused animal welfare research in Bangladesh has been limited, and our research is the first of this nature to be carried out in this country. Although a ‘Cruelty to Animals Act’ (1920) is in force, ‘animal welfare’ as a concept is still novel in Bangladesh. This may explain why only 42% of participants from Bangladesh agreed that they understood what the term means. This may also be impacted by literacy rates and education levels, which are the second lowest of countries in this study. A lack of familiarity with animal welfare, however, does not mean a lack of care or that animals are not having any needs met. In fact, the findings of this study suggest the opposite, particularly in regard to farmed animals (82.5%). Most Bangladeshis live in villages and are subsistence farming, most commonly of goats and sheep ([World Bank, 2006](#)). Proximity to farmed animals is high and the opportunity for cognitive dissonance is low. In many instances, families live with their livestock and their livelihood depends on the health and welfare of their livestock, hence there is a mutual benefit on which to base animal welfare initiatives ([Sinclair et al., 2019a](#)).

Bangladeshis reported a higher sensitivity to chickens in regard to pain, the highest mean across all countries. Many Bangladeshis have chickens in their household from childhood ([Islam, 2022](#)). Participants also rated the importance of welfare for cattle and chickens highly compared to other species, only below that of humans, likely for the same reasons of familiarity, and utility. Eighty-five percent of Bangladeshis are Muslim, and adhere to traditional perceptions of pigs and dogs as unclean, religiously and aesthetically ([El Fadl, 2004](#); [Islamic Services of America, 2018](#)), as reflected in the findings of this study. Bangladesh does not have a pork industry, and aside for a growing population of younger town-dwellers ([Islam, 2022](#)), dogs are not kept.

### Brazil

Participants in Brazil had the second highest mean scores when considering the importance of welfare for farmed and companion animals. Almost all (99.44%) stated that they understood the meaning of animal welfare to some degree and 94% agreed that it was important to have laws that protect animals, which is supported by previous research ([Hötzel et al., 2020](#)). Brazilian participants were one of three countries that placed the welfare of dogs higher than humans. Dogs are present in 42% of Brazilian households, according to official census, and the majority of dog carers consider them “part of the family” ([Vandresen and Hötzel, 2021](#); [Sociedade Nacional de](#)

*Agricultura*, 2022), which also appears to influence opinions regarding the treatment of farmed animals (Vandresen and Hötzel, 2021). Brazil also showed that most participants believed animals are sentient, with a similar pattern of sentience by species as the Brazilian sample in the present survey (i.e. higher in dogs and cattle and lower in animals that are more phylogenetically distant from humans) (Rucinke et al., 2017).

After Australia, Brazilians were most likely to state that they would pay more for products that are kinder to animals. Some Brazilians say that animal welfare influences their purchasing decisions especially for pork and poultry products (Pinto da Rosa et al., 2021; Dill et al., 2021), and that they would choose products certified for animal welfare (World Animal Protection, 2016). Except for eggs, however, availability of animal welfare friendly products is still low in Brazil (Franco et al., 2018; Pinto da Rosa et al., 2021) and prices can be as much as 2.5 times higher than conventional products (Franco et al., 2018; Teixeira et al., 2018).

Brazilians also demonstrated highest conviction that chickens feel pain (92%) and need room to explore (94%). A previous study in Brazil attributed a high capacity of sentience to chickens and fish, and belief that the ability to exercise and express natural behaviors is important (Rucinke et al., 2017; Yunes et al., 2017; Teixeira et al., 2018). In general, the pro-animal perceptions reported in this study are echoed in other studies both within Brazil, and in international comparisons (Anderson and Tyler, 2018), and present a receptive audience for initiatives that advance animal welfare.

## Chile

Chilean participants emerged as the most pro-animal welfare in this study, with the highest percentage of agreement that the welfare of both farmed and companion animals is important. These findings in line with a Latin American study, in which participants strongly agreed that farm animal welfare should be safeguarded in line with the Five Freedoms (Estévez-Moreno et al., 2022). Chileans generally understood what animal welfare means (73.8%), a similar percentage seen in a previous study in Chile (Vargas-Bello-Pérez et al., 2017). Chileans again had the highest rate of agreement in regard to willingness to pay more for products kinder to animals (97.2%). This echoes findings within Chile that a strong preference and willingness to pay a higher price for meat produced under animal welfare principles existed (Schnettler, 2008).

Along with dogs and koala, the welfare of cattle was rated as more important than that of humans in Chile. Chilean consumers have a positive perception of the cattle production in Chile, which they state is related to the fact that the meat that they consume comes from pasture fed animals (Schnettler, 2008; Morales et al., 2013). Considering dogs, Chile passed the Law on Responsible Pet Ownership (Law 21.020) in 2017 that recognizes

'pets' as sentient beings that require certain standards of care and management, in place of their previous status as 'property'. The government then developed a companion animal program with significant public funding, with many public municipalities participating in the program throughout the country (Garde et al., 2022). These reformative changes resulted from public pressure, placing the findings of our study in context. Chileans also had the highest levels of agreement that it was important to have laws to protect animals. Animal Protection Law (20380) focusing on the management and welfare of farmed animals was passed in 2009. Latin American consumers believed that farm animal welfare education, the development of new laws to improve farmed animal welfare and the regulation of imports of animal products that incorporate animal welfare requirements were highly important (Estévez-Moreno et al., 2022).

## China

Most Chinese participants in this study agreed that the welfare of both farmed animals and companion animals was important to them (81.5%, 83.2%). This differs from the findings of a 2018 study, in which only 46% of general public participants in China stated that it was 'important that farmed animals were well cared for' (Anderson and Tyler, 2018). Another previous study with university students, however, also found a high level of importance placed on 'animal protection' in general, and as compared to other social issues (Sinclair and Phillips, 2017). The differences in reported findings could indicate rapidly growing support for animal welfare and rights in China, which is anecdotally reported (Li, 2021), while also a reflection on the high education level and young age of the participants engaged in this study (85.1% university level education).

However, participants in China expressed the second lowest level of agreement that the welfare of farmed animals was important, and the fourth lowest in regard to companion animals. In earlier surveys, Chinese participants reported far lower concern for the welfare of farmed animals as compared to those in Russia, Brazil, and India (Anderson and Tyler, 2018) and a lower associated importance of animal welfare as compared to fellow Asian nations (Sinclair et al., 2017a). Across the species, participants in China associated importance in a trend similar to those in most other countries, placing the welfare of those with physical traits most similar to humans higher.

Chinese participants reported the lowest level of understanding of 'animal welfare' (30.1%), similar to a study that found 33.23% of Chinese consumers understood the term (Xu et al., 2019). The term 'animal welfare' as it is understood today was introduced into China in the 1990s (BaoLi, 2016), and it is hypothesized that early translations of the term into Chinese caused misunderstanding (Shi, 2020), and that some level of confusion remains today (Li et al., 2018; Sinclair and Phillips, 2018).

Interestingly, a high proportion of Chinese participants stated that it was important to have laws to protect the welfare of animals, although no law specific to the welfare of animals exists in China to date. Important progress has commenced, however, in the development of 'Farm Animal Welfare Requirements' (China Association for Standardisation, 2021), and the continued development of species specific guidelines.

In our study, 83.5% of Chinese participants indicated they would pay more for products kinder to animals. This is an increase on an earlier study that suggested 56.9% of Chinese consumers would engage with higher welfare products, as an element of improved product quality, however availability of those products along with accurate and reliable labelling need to substantially improve (Xu et al., 2019).

## India

Most participants in India agreed that the welfare of farmed animals (85%), and even more so companion animals (91.8%) was important. As a home of Dhārmic religions, the principle of 'Ahimsa', non-violence and no harm in thoughts and actions (including other animals), play an important role in the perception of animals (Kemmerer, 2011; Bhaneja, 2007). A majority of the participants in India stated they understood the meaning of animal welfare (84%). This may be underwritten by the focus given to animal welfare through ancient religious texts and teachings which have also been identified by Indian livestock leaders as a basis on which to encourage pro-animal welfare behaviors (Sinclair and Phillips, 2019). Likewise, most Indian participants (86.1%) considered laws for protection of animal welfare to be important. The Prevention of Cruelty to Animals Act has existed in India since 1960, and the Government of India has banned the use of wild animals in entertainment, banned the import of fur animal skins, and cosmetics tested on animals (World Animal Protection, 2022), all of which are considerable legislative reforms for a lesser developed nation. The presence of law, however, does not indicate implementation and enforcement, and this has been criticized (Mishra and Choudhary, 2019; Sinclair and Phillips, 2019). Additionally, previous literature focused on India suggested that although Indians may state that they care about animals, they may lack the impulse to take action to protect them (Mishra and Choudhary, 2019).

Considering species specific findings, the welfare of dogs and cattle were considered the most important, below that of humans. Cattle are spiritually revered in India, receiving highly positive perceptions, legislative protection and religious protection to the point of political contention (Sharma et al., 2019). Despite this, cattle face many welfare challenges in India, including within cow rescue shelters (Gaushalas) (Sharma et al., 2020).

Indian participants in the current study also mostly agreed that chickens feel pain (87.2%) and have emotions (78%), but

then had the lowest rate of agreement across all countries in this study concerning the perceived need for chickens to have room to explore and exercise (62.4%). These findings suggest that awareness and knowledge building around species specific experiences and needs could be indicated in India. Interestingly, Indians perceive similar awareness towards the ability of fish to experience both pain and emotions. This might be in part due to the inclusion of fish in Hindu religious worship where they are routinely fed as a ritual directed by religious priests in many parts of India (Sharma, 2022).

Further research may be indicated to assess pro-animal behaviors in line with perceptions in India, and to identify key opportunities to leverage pro-animal attitudes into welfare initiatives with positive impact on the animals.

## Malaysia

Participants in Malaysia mostly agreed that the welfare of farmed and companion animals is important to them. Malaysia has a clear and comprehensive Animal Welfare Act (2015), Codes of Practice for the treatment of farmed animals are planned, and the establishment of a National Animal Welfare Strategy aims to build the country into a leader in animal welfare (World Animal Protection, 2020a).

Malaysia is a predominantly Muslim country (Islamic Tourism Centre of Malaysia, 2018), however the welfare of dogs was still rated as relatively important. The visibility of suffering and of practices considered cruel through viral footage (e.g., stray dog control depicting municipality workers using wire loops) may contribute to this, with Malaysians amongst the higher consumers of social media in the world per capita (5th) (Statistica Research Department, 2021).

Likewise, the welfare of pigs was rated with more importance than seen in other majority Muslim nations in this study. This may be associated with the higher developmental status of Malaysia and therefore the more global exposure, and the relatively high education levels reported amongst Malaysian participants. It also supports a hypothesis that attitudes to animals may be more influenced by the culture in which a religion is found, rather than religion alone.

The welfare of cattle received higher levels of perceived importance compared to other farmed species, which may also be due to visibility and exposure; where chickens and pigs are farmed intensively and out of public sight, most cattle are raised extensively in Malaysia in small herds on open palm oil plantations and near roadsides (Lee, 2022). These findings suggest a compelling impact of media in Malaysia, in regard to perceptions of animals and the importance of their welfare.

## Nigeria

The 79.8% of participants in Nigeria who stated that they understood the meaning of animal welfare, ranked them midway in the sample countries. More than two-thirds of Nigerians are

involved in agriculture, mainly at subsistence level (Food and Agricultural Organization, 2021), and although most participants agreed that the welfare of farmed animals was important to them (77.8%), the country ranked the lowest in this study. This could be associated with the high level of poverty and poor economic situation (Wadhwa, 2018), and therefore a preoccupation with more pressing issues. This agrees with Maslow's Hierarchy of Needs, whereby humans are motivated by fundamental requirements, such as food supply, clean water and basic health care before higher level needs such a philosophical contemplation of self (and arguably, other animals) (Maslow, 1969). Nonetheless, animal welfare was still considered important by participants in Nigeria, farmed animal welfare slightly more so than companion animal welfare, which could be indicative of the utility and mutual reliance of the animals, and proximity. Several animal welfare Organizations and tertiary institutions linked to the Universities Federation for Animal Welfare (UFAW) operate in Nigeria with mandates to increase animal welfare awareness (Iyasere, 2022).

After humans, the welfare of chickens and cattle was considered most important in Nigeria. These are the most commonly reared and consumed animals. Chickens are produced both at small and large scale throughout Nigeria. Most of the cattle produced in Nigeria comes from the North under nomadic systems where the herd is moved from the North to the South on foot in search of grass and water (Bolajoko et al., 2020). The welfare of dogs was also considered important, likely due to the practice of keeping dogs for security purposes which drives increasingly profitable dog breeding businesses in Nigeria (Hambolu, 2014).

Nigeria respondents strongly supported laws to protect the welfare of animals (83.2%) even though in Nigeria there is no specific or unified law in relation to animal protection. The Criminal Code (1990) and The Animal Disease (Control) Act (2004) provides some protections for animals (World Animal Protection, 2022), however the implementation of such laws are extremely low (25%) probably due to the mild penalties for defaulters or that most people are not aware of the existence of such laws (Olukole, 2008).

## Pakistan

To the authors knowledge, this is first time work of this nature has been conducted in Pakistan. Participants in Pakistan had the second highest rate of agreement that the welfare of farmed animals was important (95.2%). This may be indicative of the status of mutual reliance and utility farmed animals have in community livelihoods, the proximity and exposure Pakistani's regularly have to these animals, and perceived ties between the welfare of animals and the benefits it may have, such as increased health and productivity (Sinclair et al., 2019a). This is also supported in the similar ratings for the importance of 'welfare that Pakistani participants allocated to humans, cattle

and chickens. Considering the findings of this study in this context, this presents opportunity for mutually beneficial animal welfare initiatives in Pakistan.

Although Pakistani participants rated the welfare of dogs with the lowest importance of all countries in line with Muslim sentiments, they surprisingly had the fourth highest rate of agreement that the welfare of companion animals was important to them. This may be indicative of a rapidly growing 'pet' keeping practices that include 'Pakistani Cats', parrots (The Daily Patriot, 2022), and exotic animals (Bennett, 2020).

Ninety-four percent of the participants also agreed that they understand what animal welfare means and as many agreed that it was important to have animal protection laws, despite the absence of an established animal welfare sector, or up-to-date animal protection legislation. A small number of public and private organizations have started working on building awareness around the welfare of animals in Pakistan, primarily focused on one or two species (Idris, 2022). Additionally, the introduction of the Halal Authority Act (2015) mandates humane treatment of animals while being slaughtered, and aims to reduce psychological suffering in some ways (World Animal Protection, 2020b).

## Philippines

A very high proportion of Filipinos (86.4%) agreed that they understood what animal welfare means and 89% support animal protection legislation. The Philippines has been home to the Philippines Animal Welfare Society (PAWS) since 1954 (The Philippines Animal Welfare Society, 2022), and has the Animal Welfare Act (1998, amended in 2013), the Wildlife Resources Conservation and Protection Act (2001), the first of which recognizes the ability to feel fear, distress and the need to express natural behaviors (World Animal Protection, 2020c). Both farmed and companion animal welfare was considered important to Filipino participants, at 87.7% and 89.3% respectively.

Filipinos also attributed a high level of importance to the welfare of all species assessed in this study, with dogs coming a close second to humans. This is perhaps unsurprising, given that the Philippines was dubbed 'the dog capital of East Asia' by (Bradley and King, 2012), and is reported to be the sixth most dog populous country in the world (Nag, 2017). This remains the case despite the persistent threat of human rabies transmitted *via* dog bite (Dizon et al., 2022), again signalling a strong bond between Filipinos and dogs.

## Sudan

To the knowledge of the authors, this study is the first of its nature, and one of the first academic studies pertaining to animal welfare in general, in Sudan. Nearly 99% of Sudanese participants understood the meaning of animal welfare to

some extent and 83% agreed that animal welfare legislation was important. Although there is no significant animal welfare movement in Sudan, or previous literature pertaining to animal welfare, the country does have an enacted law to offer some protection to animals. The Animal (Lenience and Welfare) Act (2015) outlines a definition of cruelty and lists practices for transportation, animal production and slaughter, control of stray dog populations, killing for disease control, and animal use in research and education (Mintah et al., 2016). In contrast, participants in Sudan reported amongst the lowest importance associated with the welfare of all species and the second lowest in regard to human welfare. Sudanese participants associated the second lowest importance to the welfare of dogs and pigs. Almost all participants from Sudan identified as Muslim (93.3%), and this finding echoes the trends in other Islamic majority countries in this study in accordance with Islamic law (Fluehr-Lobban, 2007).

To date, there is no readily accessible evidence of animal welfare Organizations or an active animal welfare movement in Sudan. Referring to Maslow's Hierarchy of Needs, this may be a result of Sudanese people prioritizing concerns they perceive to be more pressing, such as food security, personal safety and human rights (Human Rights Watch, 2021), amidst civil and political unrest (Gavin, 2021).

Three-quarters agreed that companion animal welfare was important, rising to 85% for farm animals. Coupled with the lack of developed animal welfare movement in this area, and the identified tie between livestock welfare and human welfare in Sudan (Trevor Wilson, 2018) this presents opportunity for 'One Welfare' based initiatives that aim to increase human and animal welfare simultaneously.

## Thailand

Most participants in Thailand agreed that farmed animal (83%) and companion animal (91.3%) welfare was important to them, and 90.5% agreed that it was important to have laws to protect animal welfare. The Prevention of Animal Cruelty and Provision of Animal Welfare Act (2014), Elephant Ivory Tusks Act B.E. 2558 (2015) and the Animals for Scientific Purposes Act B.E. 2558 (2015) have all been enacted in relatively recently in Thailand, and each contain some protections to animals (World Animal Protection, 2020d). Participants in Thailand attributed importance to welfare across species in a similar way seen in many other countries; humans, followed by dogs, followed by species generally in order of human likeness and therefore relatability.

Thai participants tended to strongly agree that both chickens and fish feel pain (93.7% and 89.7% respectively), and had the highest attribution of capacity for emotions to both chickens (88.5%) and fish (85.8%) of all countries in this study. This is likely primarily attributable to the fundamental influence of Buddhism throughout Thailand with 93.3% participants

identifying as Buddhist equalling the 93.2% reported in the general population (PEW Research Centre, 2012). Buddhist philosophy attributes sentience to all forms of life, adhering to the non-violence and non-harm principle of ahimsā, which it shares with Hinduism and Jainism (Phelps, 2004). Based on these principles, Thai people are encouraged to be kind and gentle from a young age. This cultural tendency and the fundamental teachings of Buddhism have been identified by livestock leaders in Thailand as one basis to be leveraged to continue building animal welfare awareness in the country (Sinclair and Phillips, 2019).

## United Kingdom (UK)

Animal welfare has a long history of importance in the UK, with the first animal protection legislation passed in 1822 (Cruel Treatment of Cattle Act, 1822) and 1835 (Cruelty to Animals Act, 1835), with multiple amendments or updates up to 2006 (Animal Welfare Act, 2006). During membership of the European Union, animal welfare has been an important topic, and since Brexit, the maintenance of high animal welfare standards under the threat of imports with lower animal welfare standards has been vocally supported, with a lot of media coverage. The recent Animal Welfare (Sentience) Act, 2022 recognizes animal sentience in law for the first time. It is perhaps unsurprising that 99.2% of UK respondents report some understanding of what animal welfare means.

The welfare of companion animals, with a mean Likert score of 6.08 and a 90.9% agreement, is seen as slightly more important than that of farm animals, with 5.75 and 88.6% agreement. The most recent Pet Population Report shows that 59% of households have at least one pet (PFMA, 2021). A far greater proportion of the UK population will have direct contact with companion animals than farm animals. UK livestock farm workers made up only 0.22% of the population in 2016 (DEFRA, 2016).

The concept of paying for products that are kinder to animals is supported by 86.2% of respondents, although the UK population regards welfare to already be generally good on UK farms. An EU survey (EC, 2016) showed that only 25% of UK respondents thought welfare of farm animals certainly needed to be improved placing it 23rd out of the 25 EU countries at that time. In terms of willingness to pay (WTP), the UK has a significantly lower WTP than other regions of the world (Clark et al., 2017) reflecting the high welfare standards already in place.

UK citizens were clear that chickens can feel pain (6.27/7) and need space to exercise (6.13/7). However, they are less clear on whether chickens can feel emotions. The UK produces 60% of eggs in free range systems (DEFRA, 2022), and it is likely that the public's first thoughts about chicken welfare is likely to be about laying hens, hence the 'space' question scoring highly. There is above average concern regarding chickens and pain, but below

average regarding chickens' ability to feel emotions. For fish, the UK public are again average with regards to ability to feel pain but drop to last when it comes to fish feeling emotions. Fish are the third most popular pet in the UK, with about 12% of households keeping fish. Clearly there is some understanding of pain, but the concept of emotional lives of animals, or at least chickens and fish, seems to be relatively low comparatively. In a multinational study, fish were attributed low level of sentience by UK students (Phillips and McCulloch, 2005).

## United States (US)

The US respondents were the most confident in their own understanding of what animal welfare means, with all stating they knew, or had some knowledge of, its meaning. This contrasts slightly with another US study carried out by Erasmus and Rollins (2021) where about 3.5% of survey respondents acknowledged no understanding of animal welfare. Even though they profess to understand what animal welfare means, US respondents rank low in terms of the 'importance to me' questions. They are 12/14 for welfare importance of farm animals and 10/14 for importance of companion animals in terms of scores, but with about 87% of respondents showing general agreement that animal welfare is important to them. This corresponds with Erasmus and Rollins (2021), where the question 'animal welfare is important' gained 85% general agreement.

Although 81% of US respondents generally agree that they would pay more for products with increased animal welfare characteristics, other studies have found that very few consumers will rate this as an important determinant when purchasing. When included in a list of attributes, the share of importance for animal welfare was only around 4-5%, compared to over 20% for each of food safety and freshness (Lister et al., 2017). A similar study including animal welfare in the term "natural" had this attribute with a 2.6% share of importance, compared with 34.2% for food safety and 21.5% for price (Lusk and Briggeman, 2009).

Responses to questions about chicken and fish welfare, place the US at or nearly bottom, both in terms of score and percent of agreement. Given all respondents stated at least some understanding of animal welfare meaning, this either indicates that respondents do not truly understand the meaning, or that they do understand but lack empathy. The considered importance of welfare by species supports this latter view, with the score for the welfare of humans being lowest out of all 14 countries. Culturally, the United States is considered individualistic and elements of empathy are possibly lower in individualists (Duan et al., 2008). There is also a negative connotation to the term "welfare", which is linked to human social welfare with strong belief (59.7% of Reuters/Ipsos poll respondents) that many poor people receiving financial aid or "on welfare" are "just looking for a free handout" (Cooke et al., 2012).

## Limitations

Some of the limitations within this study are familiar to survey methodologies. The data collected in surveys relies on self-reporting, which can be impacted by social desirability bias, and other biases. Survey respondents in some Asian nations such as China have a tendency to avoid extreme responses, which may impact the findings of this study. Additionally, in many countries' participant demographics are not directly representative of the general population, with balance in favor of more educated and younger participants, and a varied balance of male to female depending on the country. Particular limitation is noted with the dataset of Australian participants, and the self-selection of participants in Brazil. Despite randomized participant recruitment in Australia, a higher than societally representative sample of participants who do not eat meat (23%) were included (compared to 12.1% in reality). Given the nature of content in this study, this demographic is likely to have slightly skewed results in Australia towards pro-animal responses, and therefore caution is advised in interpreting the results for this country. Lastly, this study focusses on perceptions by country, based on previous research that demonstrates country-wide culture to be a significant factor in attitudes to animal welfare. The authors acknowledge that regional and sub cultures can differ, and that geographical difference occur within countries. The authors also wish to draw attention to the diversity of language; although translations were careful and a definition of animal welfare was shared, connotations of specific translations may vary across region. For example, 'animal welfare', 'emotions', 'pain' may translate into a generic or existing concepts in local language that slightly differ. The subtlety of language is an important consideration specifically for international Organizations interpreting these findings and developing training, awareness or campaign initiatives. Local collaboration is urged and a deeper investigation of language and meanings as they are locally understood is recommended. This study is designed as generalized snapshot of perceptions across countries, and therefore findings should be interpreted as such.

## Conclusion

For many countries included in this study, this constitutes the first-time comparative research with data of this nature has been conducted. The findings of this research show that most participants across all countries agreed that the welfare of both farmed animals and companion animals was important to them, and that laws to protect that welfare were also important. Important differences exist by country, and the findings have also been presented within the context of each country, for ease of and incorporation into locally strategy where suitable. In summary, key findings could be summarized into seven

important take-away messages; (1) Most people care about animal welfare. (2) Perceptions of animals and their worthiness of welfare consideration varies by country. (3) Most people agree that chickens and fish feel pain, and to a lesser degree, that they experience emotions, highlighting the importance of animal welfare practices and policies for these species. (4) The assumption that humans always care more about the welfare of companion animals than farmed animals is challenged. To the contrary, in some nations the welfare of farmed animals was placed above that of companion animals, and at times rivalled that of human welfare. The utility of the animals, and proximity by way of exposure appear more significant than companionship in some countries, particularly those that are engaged with subsistence farming. (5) The notion that care for animals and their welfare is a concern of highly developed nations alone is challenged as welfare of some species was rated as more important in lesser developed nations. (6) The perception of the importance of welfare by species generally follows a trend in line with literature on human preference for other species with relatable or 'cute' faces. This trend deviated, however, in lesser developed nations (Bangladesh, Pakistan, Nigeria and Sudan), where participants placed more importance on the welfare of species that were of high instrumental utility and proximity. (7) In some countries, the welfare of dogs was considered more important than human welfare, and in others (predominately Muslim nations) it was considered of minimal importance. The findings of this research may be of use in building understanding of constituents in policy development and of target audiences for animal welfare initiatives.

## Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## Ethics statement

The studies involving human participants were reviewed and approved by University of Queensland Human Ethics Committee. The participants provided their informed consent to participate in this study.

## Author contributions

MS conceptualized the study, sourced funding, recruited the research team, administered the project, developed the research tool, analyzed the data and wrote the paper. NL, ML, AS, MI, OI, GO, and AA coordinated local data collection, provided advice on the localization of methodologies, provided interpretation of

results within the local context and proof-read the paper. CL and CK coordinated local data collection and provided advice on the localization of methodologies. MH coordinated local data collection, provided advice on the localization of methodologies, provided interpretation of results within the local context and edited the paper. GB conducted data collection, provided methodological advice and edited the paper. JM gave methodological advice, provided interpretation of results within the local context, contributed to writing the paper and edited the manuscript. All authors contributed to the article and approved the submitted version.

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## Conflict of interest

Author NL was employed by Asia Animal Happiness Consultancy.

The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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## Supplementary material

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fanim.2022.960379/full#supplementary-material>

## References

- Ajzen, I., and Fishbein, M. (1975). Factors influencing intentions and the intention-behavior relation. *Hum. Relat.* 27, 1–15. doi: 10.1177/001872677402700101
- Anderson, J., and Tyler, L. (2018) "Attitudes toward farmed animals in the BRIC countries" (Faunalytics). Available at: <https://faunalytics.org/wp-content/uploads/2018/09/BRIC-Full-Report.pdf> (Accessed May 2, 2022).
- Bao, J., and Li, Y. (2016). "China perspective: Emerging interest in animal behavior and welfare science," in *Animals and us: 50 years and more of applied ethology*. Eds. J. Brown, Y. Seddon and M. Appleby (Netherlands: Wageningen Academic Publishers). doi: 10.3920/978-90-8686-828-5\_12
- Bennett, C. (2020) *Keeping big cats as 'pets' a growing trend in Pakistan [Online]* (France). Available at: <https://www.france24.com/en/asia-pacific/20200131-focus-pakistan-big-cats-wild-lions-tigers-caged-pets-little-regard-for-animal-welfare-growing-trend> (Accessed May 2, 2022).
- Bezoz, J. (2005). "Amazon mechanical turk" (Seattle, USA: Amazon Web Services).
- Bhaneja, B. (2007). *Understanding gandhi's ahimsa (Non-violence)*. \*asteriskos 3/ 4. 215–224.
- Bolajoko, M. B., Van Gool, F., Peters, A. R., Saurez Martinez, J., Vance, C. J., and Dungu, B. (2020). Field survey of major infectious and reproductive diseases responsible for mortality and productivity losses of ruminants among Nigerian Fulani pastoralists. *Gates Open Res.* 4, 162. doi: 10.12688/gatesopenres.13164.1
- Borgi, M., and Cirulli, F. (2016). Pet face: Mechanisms underlying human-animal relationships. *Front. Psychol.* 7. doi: 10.3389/fpsyg.2016.00298
- Boulet, M., Borg, K., Faulkner, N., and Smith, L. (2021). Evenly split: Exploring the highly polarized public response to the use of lethal methods to manage overabundant native wildlife in Australia. *J. Nat. Conserv.* 61, 125995. doi: 10.1016/j.jnc.2021.125995
- Bradley, T., and King, R. (2012) *The dog economy is global—but what is the world's true canine capital?* (Washington D.C, U.S.A: The Atlantic). Available at: <https://www.theatlantic.com/business/archive/2012/11/the-dog-economy-is-global-but-what-is-the-worlds-true-canine-capital/265155/> (Accessed May 2, 2022).
- Braithwaite, V. A., and Boulcott, P. (2007). Pain perception, aversion and fear in fish. *Dis. Aquat. Organ.* 75, 131–138. doi: 10.3354/dao075131
- Burns, G. L. (2017). "Ethics and responsibility in wildlife tourism: Lessons from compassionate conservation in the anthropocene," in *Wildlife tourism, environmental learning and ethical encounters. Geoheritage, geoparks and geotourism*. Eds. I. Borges de Lima and R. Green (Cham: Springer). doi: 10.1007/978-3-319-55574-4\_13
- Burns, G. L. (2022). "Will work for food: Positioning animals in ecotourism," in *Routledge handbook of ecotourism*. Ed. D. Fennell (London: Routledge), 317–330. doi: 10.4324/9781003001768
- Burns, G. L., and Benz-Schwarzburg, J. (2021/2021). "4 representing wild animals to humans: The ethical future of wildlife tourism," in *Wildlife tourism futures: Encounters with wild, captive and artificial animals*. Ed. G. Bertella (Bristol, Blue Ridge Summit: Channel View Publications), 40–54. doi: 10.21832/9781845418182-005
- Byrd, E., Widmar, N. O., and Fulton, J. (2017). Of fur, feather, and fin: Human's use and concern for non-human species. *Animals* 7, 22. doi: 10.3390/ani7030022
- China Association for Standardisation (2021). *Farm Animal Welfare Standards* (Accessed April 14, 2022). <https://www.iccw.org.cn/uploads/soft/180612/1-1P61216210.pdf>.
- Clark, B., Stewart, G.B., Panzone, L.A., Kyriazakis, I., and and Frewer, L.J (2017). Citizens, consumers and farm animal welfare: A meta-analysis of willingness-to-pay studies. *Food Policy* 68, 112–127. doi: 10.1016/j.foodpol.2017.01.006
- Clucas, B., McHugh, K., and Caro, T. (2008). Flagship species on covers of US conservation and nature magazines. *Biodivers. Conserv.* 17, 1517. doi: 10.1007/s10531-008-9361-0
- Cohen, S. A., Prayag, G., and Moital, M. (2014). Consumer behavior in tourism: Concepts, influences and opportunities. *Curr Issues Tour* 17, 872–909. doi: 10.1080/13683500.2013.850064
- Cooke, K., Rohde, D., and McNeill, R. (2012). *The Undeserving Poor*. Available online at: <https://www.reuters.com/subjects/income-inequality/indiana> (accessed March 21, 2022)
- Colléony, A., Clayton, S., Couvet, D., Saint Jalme, M., and Prévot, A. (2017). Human preferences for species conservation: Animal charisma trumps endangered status. *Biol. Conserv.* 206, 263–269. doi: 10.1016/j.biocon.2016.11.035
- Constable, S., and Dixon, R. (2010). ). for the love of dog: The human–dog bond in rural and remote Australian indigenous communities. *Anthrozoös* 23, 337–349. doi: 10.2752/175303710X12750451259336
- Cornish, A., Raubenheimer, D., and McGreevey, P. (2016). What we know about the public's level of concern for farm animal welfare in food production in developed countries. *Animals* 6, 74. doi: 10.3390/ani6110074
- Dang, J. (2017) *Favoring one over the other: bias in animal conservation*. Available at: <https://writingscience.web.unc.edu/2017/09/favoring-one-over-the-other-bias-in-animal-conservation/> (Accessed April 14, 2022).
- DEFRA - Department of the Environment and Rural Affairs (2016). *Agricultural Labour in England and the UK Farm Structure Survey 2016* Available online at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/771494/FSS2013-labour-statsnotice-17jan19.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/771494/FSS2013-labour-statsnotice-17jan19.pdf) (Accessed March 21, 2022)
- DEFRA - Department of the Environment and Rural Affairs. (2022). *Quarterly UK Statistics about Eggs - Statistics notice (data to December 2021)* Available online at: <https://www.gov.uk/government/statistics/egg-statistics/quarterly-uk-statistics-about-eggs-statistics-notice-data-to-june-2021> (accessed March 21, 2022)
- De Passillé, A. M., and Rushen, J. (2005). Food safety and environmental issues in animal welfare. *Rev. Sci. Tech.* 24, 757–766. doi: 10.20506/rst.24.2.1599
- . (2018). How do Brazilian citizens perceive animal welfare conditions in poultry, beef, and dairy supply chains? *PLoS One* 13, e0202062. doi: 10.1371/journal.pone.0202062
- Dill, M. D., de Andrade, A. R. S., Boito, B., de Souza Araújo, M. C., de Moraes, M. D., da Silva, T. A., et al. (2021). Concerns, attitudes, and opinions of meat buyers in garanhuns, pernambuco, Brazil. *Rev. Bras. Zootec.* 50, 1–12. doi: 10.37496/rbz5020200003
- Di Maio, M., and Fiala, N. (2020). Be wary of those who ask: A randomized experiment on the size and determinants of the enumerator effect. *World Bank Economic Rev.* 34 (3), 654–669. doi: 10.1093/wber/lhy024
- Dizon, T. J. R., Saito, N., Inobaya, M., Tan, A., Reñosa, M. D. C., Bravo, T. A., et al. (2022). Household survey on owned dog population and rabies knowledge in selected municipalities in bulacan, Philippines: A cross-sectional study. *PLoS Negl. Trop. Dis.* 16 (1), e0009948. doi: 10.1371/journal.pntd.0009948
- Duan, C., Wei, M., and Wang, L. (2008). The role of individualism-collectivism in empathy: An exploratory study. *Asian Journal of Counselling.* 15, 57–81
- El Fadl, K. A. (2004). "Dogs in the Islamic tradition and nature," in *Encyclopedia of religion and nature* (New York, U.S.A: Continuum International).
- Erasmus, M., and Rollins, J (2021). Visitors' self-reported knowledge and attitudes about an animal-free exhibit on animal welfare. *Journal of Applied Animal Welfare Science.* doi: 10.1080/10888705.2021.1880905
- Estévez-Moreno, L. X., Miranda-de la Lama, G. C., and Miguel Pacheco, G. G. (2022). Consumer attitudes towards farm animal welfare in Argentina, Chile,

- Colombia, Ecuador, Peru and Bolivia: A segmentation-based study. *Meat Sci.* 187, 108747. doi: 10.1016/j.meatsci.2022.108747
- Estren, M. J. (2017). The neoteny barrier: seeking respect for the non-cute. *J. Anim. Ethics* 2 (1), 6–11. doi: 10.5406/janimalethics.2.1.0006
- European Commission, Directorate-General for Health and Food Safety (2016) *Attitudes of Europeans towards animal welfare: report* (European Commission). Available at: <https://data.europa.eu/doi/10.2875/884639> (Accessed May 2, 2022).
- Fabian, M. C., Cook, A. S., and Old, J. M. (2020). Attitudes towards wildlife conservation. *Austral. Zool.* 40, 585–604. doi: 10.7882/AZ.2019.017
- Ferreira, A., and Santos, A. P. (2008). Do students' perceptions matter? a study of the effect of students' perceptions on academic performance. *Accounting Finance* 48 (2), 209–231. doi: 10.1111/j.1467-629X.2007.00239.x
- Fluehr-Lobban, C. (2007). *Islamic Law and society in the Sudan* (Milton Park, UK: Routledge). doi: 10.4324/9781315888255
- Food and Agricultural Organization (2021) *Nigeria At a glance* (Food and Agricultural Organization). Available at: <https://www.fao.org/nigeria/fao-in-nigeria/nigeria-at-a-glance/en/> (Accessed May 2, 2022).
- Franco, B. M. R., Souza, A. P. O., and Molento, C. F. M. (2018). Welfare-friendly products: availability, labeling and opinion of retailers in Curitiba, southern Brazil. *Rev. Econ. Sociol. Rural* 56, 9–18. doi: 10.1590/1234-56781806-94790560101
- Garde, E., Marin-Vial, P., Pérez, G. E., and Sandvig, E. M. (2022). A review and analysis of the national dog population management program in Chile. *Animals* 12, 228. doi: 10.3390/ani12030228
- Gavin, M. (2021) *The crisis in Sudan: What to know* (Council on Foreign Relations). Available at: <https://www.cfr.org/in-brief/crisis-sudan-what-know> (Accessed May 2, 2022).
- Grandin, T. (2015). "The effect of economic factors on the welfare of livestock and poultry," in *Improving animal welfare: a practical approach*. Ed. T. Grandin (Oxfordshire, UK: CABI). doi: 10.1079/9781780644677.0278
- Grandin, T. (2020). "The importance of good pre-slaughter handling to improve meat quality in cattle, pigs, sheep and poultry," in *The slaughter of farmed animals: Practical ways of enhancing animal welfare* (Wallingford, UK: CABI), 229. doi: 10.1079/9781789240573.0229
- Green, M. F., Hellemann, G., Horan, W. P., Lee, J., and Wynn, J. K. (2012). From perception to functional outcome in schizophrenia: modeling the role of ability and motivation. *Arch. Gen. Psychiatry* 69 (12), 1216–1224. doi: 10.1001/archgenpsychiatry.2012.652
- Grunert, K. G. (2002). Current issues in the understanding of consumer food choice. *Trends Food Sci. Technol.* 13 (8), 275–285. doi: 10.1016/S0924-2244(02)00137-1
- Gunnthorsdottir, A. (2001). Physical attractiveness of an animal species as a decision factor for its preservation. *Anthrozoös* 14 (4), 204–215. doi: 10.2752/089279301786999355
- Hambolu, S. E. (2014). Dog ecology and population studies in Lagos state, Nigeria. *Global J. Health Sci.* 6 (2), 209–220. doi: 10.5539/gjhs.v6n2p209
- Ha, H. Y., and Perks, H. (2005). Effects of consumer perceptions of brand experience on the web: brand familiarity, satisfaction and brand trust. *J. Consumer Behav.* 4 (6), 438–452. doi: 10.1002/cb.29
- Harvard Divinity School (2022) *Islam In Nigeria* (Cambridge, U.S.A: Harvard University). Available at: <https://rpl.hds.harvard.edu/faq/islam-nigeria> (Accessed May 2, 2022).
- Hills, A. M. (1993). The motivational bases of attitudes toward animals. *Soc. Anim.* 1 (2), 111–128. doi: 10.1163/156853093x00028
- Hofstede, G., Hofstede, G. J., and Minkov, M. (2010). *Cultures and organizations: Software of the mind* (New York, USA: McGraw-Hill).
- Hötzel, M. J., Yunes, M. C., Vandresen, B., Albernaz-Gonçalves, R., and Woodroffe, R. E. (2020). On the road to end pig pain: knowledge and attitudes of Brazilian citizens regarding castration. *Animals* 10 (10), 1826. doi: 10.3390/ani10101826
- Human Rights Watch (2021) "World report 2021: Sudan" (New York, U.S.A: Human Rights Watch). Available at: <https://www.hrw.org/world-report/2021/country-chapters/sudan> (Accessed May 2, 2022).
- Idris, M. (2022). RE: Research team discussion: Study findings. Ed. M. Sinclair
- Islam, M. A. (2022). RE: Research team discussion: Study findings. Ed. M. Sinclair
- Islamic Services of America (2018) *Halal information*. Available at: <http://www.isahalal.org/Content/Halal-Information.aspx> (Accessed May 2, 2022).
- Islamic Tourism Centre of Malaysia (2018) *Islam In Malaysia*. Available at: <http://www.itc.gov.my/tourists/discover-the-muslim-friendly-malaysia/islam-in-malaysia/> (Accessed May 2, 2022).
- Iyaser, O. S. (2022). RE: Research team discussion: Study findings. Ed. M. Sinclair.
- Kellert, S. R. (1983). "Affective, cognitive, and evaluative perceptions of animals," in *Behavior and the natural environment. human behavior and environment*, vol. 6. Eds. I. Altman and J. F. Wohlwill (Boston, MA: Springer). doi: 10.1007/978-1-4613-3539-9\_8
- Kellert, S. R. (1993). Attitudes, knowledge, and behavior toward wildlife among the industrial superpowers: United States, Japan, and Germany. *J. Soc. Issues* 49 (1), 53–69. doi: 10.1111/j.1540-4560.1993.tb00908.x
- Kemmerer, L. (2011). *Animals and world religions* (Oxford, UK: Oxford University Press).
- Lan, W., and Lanthier, R. (2003). Changes in students' academic performance and perceptions of school and self before dropping out of schools. *J. Educ. Stud. Placed Risk* 8, 309–332. doi: 10.1207/S15327671ESPR0803\_2
- Launiala, A., and Kulmala, T. (2006). The importance of understanding the local context: Women's perceptions and knowledge concerning malaria in pregnancy in rural Malawi. *Acta Tropica* 98 (2), 111–117. doi: 10.1016/j.actatropica.2005.12.008
- Lawrence, E. A. (1985). "Human perceptions of animals and animal awareness: The cultural dimension," in *Advances in animal welfare science 1985/86*. Eds. M. W. Fox and L. D. Mickley (Washington, DC: The Humane Society of the United States), (pp. 285–295).
- Lee, N. (2022). RE: Research team discussion: Study findings. Ed. M. Sinclair
- Levine, E. D., Mills, D. S., and Houpt, K. A. (2005). Attitudes of veterinary students at one US college towards factors relating to farm animal welfare. *J. Vet. Med. Educ.* 32, 481–490. doi: 10.3138/jvme.32.4.481
- Li, P. J. (2021). *Animal welfare in China: Culture, politics and crisis* (Australia: Sydney University Press).
- Liñán, F. (2008). Skill and value perceptions: how do they affect entrepreneurial intentions? *Int. Entrep Manage J.* 4, 257–272. doi: 10.1007/s11365-008-0093-0
- Li, X., Zito, S., Sinclair, M., and Phillips, C. J. C. (2018). Perception of animal welfare issues during Chinese transport and slaughter of livestock by a sample of stakeholders in the industry. *PLoS One* 13 (6), e0197028. doi: 10.1371/journal.pone.0197028
- Lister, G., Tonsor, G. T., Brix, M., Schroeder, T. C., and Yang, C. (2017). Food values applied to livestock products. *Journal of Food Products Marketing* 23 (3), 326–341. doi: 10.1080/10454446.2014.1000436
- Lusk, J. L., and Briggeman, B. C. (2009). Food values. *Am J Agri Econ.* 91 (1), 184–196. doi: 10.1111/ajae.2009.91.issue-1
- Machin, K. L. (2005). Avian pain: physiology and evaluation. *Comp. Cont Educ. Pract. Vet.* 27 (2), 98–109.
- Malek, L., Umberger, W. J., and Rolfe, J. (2017). Segmentation of Australian meat consumers on the basis of attitudes regarding farm animal welfare and the environmental impact of meat production. *Anim. Prod. Sci.* 58 (3), 424–434. doi: 10.1071/AN17058
- Manzano, A. M., Lu, D., Hort, J., and Day, L. (2020). Chinese consumers' preferences for fermented dairy foods. *Food New Zealand* 20 (2), 29–32. doi: 10.3316/informit.101493813069867
- Markwell, K. (2021). Getting close to a national icon: an examination of the involvement of the koala (*Phascolarctos cinereus*) in Australian tourism. *Tour. Recreat. Res.* 46 (4), 473–486. doi: 10.1080/02508281.2020.1815411
- Martín-López, B., Montes, C., Ramirez, L., and Benayas, J. (2009). What drives policy decision-making related to species conservation? *Biol. Conserv.* 142 (7), 1370–1380. doi: 10.1016/j.biocon.2009.01.030
- Maslow, A. H. (1969). The farther reaches of human nature. *J. Transpersonal Psychol.* 1 (1), 1–9.
- Mayers, B. A. J. (2021) The impact of self-perception of academic ability on academic performance in African American, Male, first generation college students (PhD, Drexel University). Available at: <https://www.proquest.com/docview/2561902523?pq-origsite=gscholar&fromopenview=true> (Accessed May 2, 2022).
- Meta Platforms, Krieger, M., Systrom, K. (2010). "Instagram" (Menlo Park, California, USA).
- Minitab Statistical Software LLC (1972). "Minitab statistical software".
- Mintah, G., Briscoe, R., and Mukanda, B. (2016) "Veterinary legislation identification mission report: Sudan". In: *Veterinary legislation support program* (World Organization for Animal Health (OIE). Available at: <https://www.oie.int/app/uploads/2021/03/2020-vetlegislation-identificationreport-sudan-en-.pdf> (Accessed May 2, 2022).
- Mishra, A., and Choudhary, N. (2019). Lack of implementation of animal laws in India: A critical appraisal. *Supremo Amicus* 11, 91–103.
- Mooney, K. M., DeTore, J., and Malloy, K. A. (1994). Perceptions of women related to food choice. *Sex Roles* 31, 433–442. doi: 10.1007/BF01544199
- Morales, R., Aguiar, A., Subiabre, I., and Realini, C. (2013). Beef acceptability and consumer expectations associated with production systems and marbling. *Food Qual. Prefer.* 29 (2), 166–173. doi: 10.1016/j.foodqual.2013.02.006

- Nag, O. S. (2017) *Countries with the most dogs worldwide* (World Atlas). Available at: <https://www.worldatlas.com/articles/countries-with-the-most-dogs-worldwide.html> (Accessed May 2, 2022).
- Norman, G. (2010). Likert scales, levels of measurement and the “laws” of statistics. *Adv. Health Sci. Educ.* 15, 625–632. doi: 10.1007/s10459-010-9222-y
- OIE (2016) *Terrestrial animal health code: Section 7 (Animal welfare)* (World Animal Health Organization). Available at: <https://www.oie.int/en/what-we-do/standards/codes-and-manuals/terrestrial-code-online-access/> (Accessed May 2, 2022).
- Olivelle, P. (2022) “karma”. In: *Encyclopedia Britannica*. Available at: <https://www.britannica.com/topic/karma> (Accessed May 2, 2022).
- Olukole, S. G. (2008). Assessment of enforcement and impacts of two veterinary legislations in oyo state, Nigeria. *Nigerian Vet. J.* 29, 41–47.
- Paolacci, G., and Chandler, J. (2014). Inside the Turk: Understanding mechanical Turk as a participant pool. *Curr. Dir. Psychol. Sci.* 23 (3), 184–188. doi: 10.1177/0963721414531598
- PEW Research Centre (2012). “Forum on religion and public life and global religious landscape”. Available at: <https://assets.pewresearch.org/wp-content/uploads/sites/11/2014/01/global-religion-full.pdf> (Accessed May 2, 2020).
- PFMA - Pet Food Manufacturers' Association (2021). *Pet Population 2021* Available online at: (<https://www.pfma.org.uk/pet-population-2021>). (Accessed March 21, 2022)
- Phillips, C. J. C., and McCulloch, S. (2005). Student attitudes on animal sentience and use of animals in society. *J Biol Educ* 40 (1), 17–24. doi: 10.1080/00219266.2005.9656004
- Phelps, N. (2004). *The great compassion: Buddhism and animal rights* (New York, U.S.A: Lantern Books).
- Phillips, C. J. C., Izmirli, S., Aldavood, S. J., Alonoso, M., Chloe, B. I., Hanlon, A., et al. (2012). Students' attitudes to animal welfare and rights in Europe and Asia. *Anim. Welfare* 21 (1), 87–100. doi: 10.7120/096272812799129466
- Pinillos, R. G., Appleby, M. C., Manteca, X., Scott-Park, F., Smith, C., and Velarde, A. (2016). One welfare—a platform for improving human and animal welfare. *Vet. Rec.* 179 (16), 412–413. doi: 10.1136/vr.i5470
- Pinto da Rosa, P., Pio Ávila, B., Damé Veber Angelo, I., Garavaglia Chesini, R., Albandes Fernandes, T., da Silva Camacho, J., et al. (2021). Impact of different chicken meat production systems on consumers' purchase perception. *Br. Poult. Sci.* 62, 387–395. doi: 10.1080/00071668.2020.1857335
- Puckett, E. E., and Munshi-South, J. (2019). Brown rat demography reveals pre-commensal structure in eastern Asia before expansion into southeast Asia. *Genome Res.* 29, 762–770. doi: 10.1101/gr.235754.118
- Qur'an (6:145) *Al-An'am* (Quran.com). Available at: <https://quran.com/al-anam/145-154> (Accessed May 2, 2020).
- Rioja-Lang, F., Bacon, H., Connor, M., and Dwyer, C. M. (2020). Prioritisation of animal welfare issues in the UK using expert consensus. *Vet. Rec.* 187, 490–490. doi: 10.1136/vr.105964
- Robbins, J. A., Franks, B., Weary, D. M., and von Keyserlingk, M. A. G. (2016). Awareness of ag-gag laws erodes trust in farmers and increases support for animal welfare regulations. *Food Policy* 61, 121–125. doi: 10.1016/j.foodpol.2016.02.008
- Rucinque, D. S., Souza, A. P. O., and Molento, C. F. M. (2017). Perception of fish sentience, welfare and humane slaughter by highly educated citizens of bogotá, Colombia and Curitiba, Brazil. *PLoS One* 12 (1), e0168197. doi: 10.1371/journal.pone.0168197
- Schnettler, B. (2008). Consumer perception of animal welfare and livestock production in the araucania region, Chile. *Chilean J. Agric. Res.* 68 (1), 80–93. doi: 10.4067/S0718-58392008000100008
- Sharma, A. (2022) *RE: Research team discussion: Study findings* Ed. M. Sinclair
- Sharma, A., Schuetze, C., and Phillips, C. J. C. (2019). Public attitudes towards cow welfare and cow shelters (gaushalas) in India. *Animals* 9 (11), 972. doi: 10.3390/ani9110972
- Sharma, A., Schuetze, C., and Phillips, C. J. C. (2020). The management of cow shelters (Gaushalas) in India, including the attitudes of shelter managers to cow welfare. *Animals* 10 (2), 211. doi: 10.3390/ani10020211
- Shi, J. Z. (2020). “Developments in Chinese animal welfare,” in *2nd annual welfare science (China) conference the 2nd quality and welfare egg China summit; Shanghai, China*.
- Sinclair, M. (2020). *International animal welfare initiatives: Engaging stakeholders with improvement across borders* (Brisbane, Queensland, Australia: PhD, University of Queensland).
- Sinclair, M., Fryer, C., and Phillips, C. J. C. (2019a). The benefits of improving animal welfare from the perspective of livestock stakeholders across Asia. *Animals* 9 (4), 123. doi: 10.3390/ani9040123
- Sinclair, M., Idrus, Z., Burns, G. L., and Phillips, C. J. C. (2019b). Livestock stakeholder willingness to embrace preslaughter stunning in key Asian countries. *Animals* 9 (5), 244. doi: 10.3390/ani9050224
- Sinclair, M., and Phillips, C. J. C. (2017). The cross-cultural importance of animal protection and other world social issues. *J. Agric. Environ. Ethics* 30 (3), 439–455. doi: 10.1007/s10806-017-9676-5
- Sinclair, M., and Phillips, C. J. C. (2018). Key tenets of operational success in international animal welfare initiatives. *Animals* 8 (6), 92. doi: 10.3390/ani8060092
- Sinclair, M., and Phillips, C. J. C. (2019). Asian Livestock leaders' perceptions of the importance of, and solutions for, animal welfare issues. *Animals* 9 (6), 319. doi: 10.3390/ani9060319
- Sinclair, M., Zito, S., Idrus, Z., Yan, W., Nhiem, D., Lampang, P., et al. (2017a). Attitudes of stakeholders to animal welfare during slaughter and transport in SE and E Asia. *Anim. Welfare* 26 (4), 417–425. doi: 10.7120/09627286.26.4.417
- Sociedade Nacional de Agricultura (2022) [Pets are considered family members by 61% of owners, says research]. Available at: <https://www.sna.agr.br/pets-sao-considerados-membros-da-familia-por-61-dos-donos-diz-pesquisa/> (Accessed May 2, 2022).
- Sroka, W. (2020). *Perspectives on consumer behavior: theoretical aspects and practical applications* (Cham, Switzerland: Springer).
- Statista Research Department (2021) *Active social network penetration in selected countries and territories as of January 2021* (Statista). Available at: <https://www.statista.com/statistics/282846/regular-social-networking-usage-penetration-worldwide-by-country/> (Accessed May 2, 2022).
- Taylor, N., and Signal, T. D. (2009). Willingness to pay: Australian consumers and “on the farm” welfare. *J. Appl. Anim. Welfare Sci.* 12 (4), 345–359. doi: 10.1080/1088700903163658
- Teixeira, D. L., Larrain, R., and Hötzel, M. J. (2018). Are views towards egg farming associated with Brazilian and Chilean egg consumers' purchasing habits? *PLoS One* 13 (9), e0203867. doi: 10.1371/journal.pone.0203867
- Tekin, G., Yiltay, S., and Ayaz, E. (2016). The effect of brand image on consumer behavior: Case study of louis vuitton-moët hennessy. *Int. J. Acad. Value Stud.* 2 (1), 1–24. doi: 10.23929/JAVS.47
- The Daily Patriot (2022) *Changing trend of keeping pets in Pakistan* (The Patriot). Available at: <https://dailythepatriot.com/changing-trend-of-keeping-pets-in-pakistan/> (Accessed May 2, 2022).
- The Philippines Animal Welfare Society (2022) *Our story The Philippine animal welfare society*. Available at: <https://paws.org.ph/about-us/> (Accessed May 2, 2022).
- Trevor Wilson, R. (2018). Livestock in the republic of the Sudan: Policies, production, problems and possibilities. *Anim. Husb. Dairy Vet. Sci.* 2 (3), 1–12. doi: 10.15761/ahdvs.1000142
- Troudet, J., Grandcolas, P., Blin, A., Vigne-Lebbe, R., and Legendre, F. (2017). Taxonomic bias in biodiversity data and societal preferences. *Sci. Rep.* 7, 9132. doi: 10.1038/s41598-017-09084-6
- Underwood, W. J. (2002). Pain and distress in agricultural animals. *JAVMA* 221 (2), 208–211. doi: 10.2460/javma.2002.221.208
- United Nations Development Program (2020) *Human development report 2020 the next frontier: Human development and the anthropocene* (New York City, U.S.A). Available at: <https://hdr.undp.org/sites/default/files/hdr2020.pdf> (Accessed May 2, 2022).
- Vandresen, B., and Hötzel, M. J. (2021). Pets as family and pigs in crates: Public attitudes towards farrowing crates. *Appl. Anim. Behav. Sci.* 236, 105254. doi: 10.1016/j.applanim.2021.105254
- Vargas-Bello-Pérez, E., Miranda-de la Lama, G. C., Teixeira, D. L., Enriquez-Hidalgo, D., Tadich, T., and Lensink, J. (2017). Farm animal welfare influences on markets and consumer attitudes in Latin America: The cases of Mexico, Chile and Brazil. *J. Agric. Environ. Ethics* 30, 697–713. doi: 10.1007/s10806-017-9695-2
- Varki, S., and Colgate, M. (2001). The role of price perceptions in an integrated model of behavioral intentions. *J. Service Res.* 3 (3), 232–240. doi: 10.1177/109467050133004
- Wadhwa, D. (2018) *The number of extremely poor people continues to rise in Sub-Saharan Africa* (Washington, DC., USA: World Bank). Available at: <https://blogs.worldbank.org/opendata/number-extremely-poor-people-continues-rise-sub-saharan-africa> (Accessed May 2, 2022).
- Webb, T. L., Sniehotta, F. F., and Michie, S. (2010). Using theories of behavior change to inform interventions for addictive behaviors. *Addiction* 105 (11), 1879–1892. doi: 10.1111/j.1360-0443.2010.03028.x
- Westbury, H. R., and Neumann, D. L. (2008). Empathy-related responses to moving film stimuli depicting human and non-human animal targets in negative circumstances. *Biol. Psychol.* 78 (1), 66–74. doi: 10.1016/j.biopsycho.2007.12.009
- World Animal Protection (2016). “Consumo às cegas - percepção do consumidor sobre o bem-estar animal” (Sao Paulo, Brazil: World Animal Protection).
- World Animal Protection (2020a) *Animal protection index: Malaysia*. Available at: <https://api.worldanimalprotection.org/country/malaysia> (Accessed May 2, 2022).

World Animal Protection (2020b) *Animal protection index: Pakistan*. Available at: <https://api.worldanimalprotection.org/country/pakistan> (Accessed May 2, 2022).

World Animal Protection (2020c) *Animal protection index: Philippines*. Available at: <https://api.worldanimalprotection.org/country/philippines> (Accessed May 2, 2022).

World Animal Protection (2020d) *Animal protection index: Thailand*. Available at: <https://api.worldanimalprotection.org/country/thailand> (Accessed May 2, 2022).

World Animal Protection (2022) *Animal protection index: India*. Available at: <https://api.worldanimalprotection.org/country/india> (Accessed May 2, 2022).

World Bank (2006) *Bangladesh: Growing the economy through advances in agriculture*. Available at: <http://www.worldbank.org/en/results/2016/10/07/bangladesh-growing-economy-through-advances-in-agriculture> (Accessed May 2, 2022).

[bangladesh-growing-economy-through-advances-in-agriculture](#) (Accessed May 2, 2022).

Wulderk, Z., Quaade, S., Anderson, J., Dillard, C., Sánchez-Suárez, W., and Beggs, T. (2022) "Comparing beliefs about fishes and chickens & their relation to animal-positive behaviors across countries" (Faunalytics Mercy for Animals). Available at: <https://faunalytics.org/chicken-and-fish-2-comparative/#> (Accessed May 2, 2022).

Xu, L., Yang, X., Wu, L., Chen, X., Chen, L., and Fu-Sheng Tsai, F. S. (2019). Consumers' willingness to pay for food with information on animal welfare, lean meat essence detection, and traceability. *Int. J. Environ. Res. Public Health* 16 (19), 3616. doi: 10.3390/ijerph16193616

Yunes, M. C., von Keyserlingk, M. A. G., and Hötzel, M. J. (2017). Brazilian Citizens' opinions and attitudes about farm animal production systems. *Animals* 7 (10), 75. doi: 10.3390/ani7100075