

## Is pet ownership associated with values and attitudes towards animals?

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### Abstract

In Organisation for Economic Co-operation and Development (OECD) countries, the number of pets and pet owners has been increasing in recent years. The experiences people have with pets might impact their relationships with animals in general and especially attitudes towards animal protection and use. However, research on the impact of pet ownership on values and attitudes towards animals is relatively scarce. We analyse associations of pet ownership with different values and attitudes towards animals. We derived seven attitude constructs towards animals from three different datasets using Principal Component Analyses. Data were collected using standardised online surveys with German residents (dataset 1 = 1,049 respondents; dataset 2 = 414 respondents; dataset 3 = 1,048 respondents). All three samples are non-probability quota samples. The seven attitudinal constructs represent values and attitudes towards animals ranging from general values and attitudes towards, eg animal protection, to more specific attitudes towards, eg eating animals. We analysed the relationship of pet ownership, sex, and age with these constructs using ANOVA. Our results show that effect sizes are small to medium. Pet ownership has the strongest association with more general values and attitudes towards animals, with pet owners being, eg more involved in animal protection and more in favour of awarding fundamental rights to animals. In contrast, we found that more specific attitudes, such as the evaluation of current pig farming systems or attitudes towards eating meat, were more related to sex than pet ownership. Our findings indicate that having pets relates to their owners' attitudes towards animals, but that this association varies depending on the specificity of attitudes.

**Keywords:** animal husbandry, animal protection, animal welfare, companion animals, farmed animals, human-animal relationship

### Introduction

Pets have an important status in today's society. In most Western countries, the number of households with pets is continuously increasing (Sandøe *et al* 2016). In Germany, for instance, the proportion of households with at least one pet has increased from one-third to around 45% over the last decade (IVH 2009; ZZF & IVH 2019). Thus, today, almost every second household has pets. In particular, the number of pet cats (+75%) and dogs (+87%) has increased significantly over the last ten years (Statista 2021a). Similar trends can be observed in other European countries (Statista 2021b).

Research has shown that pets influence humans in multiple ways. They have been shown to have positive associations with the development of children and adolescents (Purewal *et al* 2017), such as with emotional health and the development of cognitive and social skills. Furthermore, pets positively affect humans' physical and mental health (Jorgenson 1997; Wells 2009; Brooks *et al* 2018). Beyond these positive associations of pet ownership, there is also evidence that living together with pets impacts pet owners' constructs of values and attitudes towards animals, supporting the 'pets as ambassadors' hypothesis (Serpell & Paul 1994).

A study by Martens *et al* (2019) revealed that young adults who have more contact with animals show a more positive attitude towards animals in general, and those owning a pet are more concerned about animal welfare than non-pet owners. Furthermore, pet owners attribute both a higher range as well as a higher complexity of emotions to animals and show stronger beliefs in animals' mental capacities (Morris *et al* 2012; Walker *et al* 2014; Kupsala *et al* 2016). In addition, growing up with pets and having a strong attachment to them during childhood is associated with greater empathy towards animals (Ellingsen *et al* 2010; Rothgerber & Mican 2014).

In the specific context of attitudes towards livestock farming, concerns about farm animal welfare are also higher among pet owners (Bir *et al* 2019), in particular among dog and/or cat owners who more likely seek information on animal welfare (McKendree *et al* 2014). Moreover, a study on pet ownership and vegetarianism showed that participants who grew up with a greater variety of pets were more concerned about animal use than those who had not (Heiss & Hormes 2018). Pet owners were also found to be more critical of intensive livestock production (Pirsich *et al* 2017).

and to have a less positive perception of farmers and of the quality of life of farm animals (Boogaard *et al* 2006). Regarding meat and meat product consumption, Dodd *et al* (2019) found pet owners to more often be vegetarians or vegans compared to the general population. Furthermore, these individuals are more likely to seek out animal welfare food labels than non-pet owners (Bir *et al* 2019), are highly interested in animal welfare meat, and have an increased willingness to pay for these products (Pirsich *et al* 2017). According to Heiss and Hormes (2018), growing up with diverse pets seems to be a predictive factor for the avoidance of animal products in adulthood, while Rothgerber and Mican (2014) concluded that the level of attachment to a pet is much more decisive for meat avoidance than ownership *per se*.

Although some studies have analysed the relationships between pet ownership and attitudes towards animals and meat consumption, they are limited in their comparability because they are using different approaches for analysing the relationships. Considering the link between pet ownership and values assigned to animals, animal treatment, and animal welfare, both in general and with regard to livestock farming, empirical research that specifically looks at how pet ownership relates to different attitudinal constructs towards animals is still relatively scarce. Often, pet ownership is one of the variables tested but is neither investigated further nor discussed. Here, we have aimed to bridge this gap by analysing the associations of pet ownership with different values and attitudes towards animals, animal protection, and animal husbandry. We thereby seek to reflect both on general values and attitudes towards animals, as well as on very specific ones related to different husbandry practices and the acceptance of eating animals.

## Materials and methods

We used three existing datasets for our analyses with collected values and attitudes towards animals of non-pet owners as well as of pet owners of varying specificity. Pet ownership was indicated by living together with a pet animal by the participants. We acknowledge at this point that the concept of owning a pet is debatable. However, we use the terms ‘owner’ and ‘ownership’ to indicate shared households of humans and pets.

All three studies involved online surveys with German residents that were conducted within research projects. Pet ownership was one of the variables collected in each of the three datasets. All three samples are quota samples. Participants were invited to take part in the survey by an online access panel provider and quotas were set to important socio-demographics according to the distribution in the German population. Details on quotas can be found in the dataset descriptions below. In the study presented herein, we used these three datasets and analysed them as regard to associations of pet ownership with different values and attitudes towards animals. As such, no information on animal farming nor the concept of animal welfare was provided to participants prior or during data collection.

Data were analysed using IBM® SPSS Statistics 26. We conducted seven confirmatory Principal Component

Analyses (PCA) to build seven constructs representing values and attitudes towards animals, animal protection, and animal husbandry. These constructs were derived theoretically and discussed among the researchers. We considered the available statements in the three datasets and chose items that reflect different levels of specificity. Ranging from general values such as involvement in animal protection up to acceptance of eating animals. By doing so, we wanted to provide a systematic order for the selected constructs. After the PCAs, we calculated unweighted indices based on the arithmetic means for each of the seven constructs. To do so, we recoded three items. We then used multiple-factor ANOVAs to analyse the associations of pet ownership, sex, and age, as well as of the interaction of sex and pet ownership, with the seven constructs including values and attitudes towards animals, animal protection, and animal husbandry. We included the interaction of sex and pet ownership because we hypothesised a strong impact of sex on our constructs and further a correlation between pet ownership and sex (eg Ramirez 2006; Schulz *et al* 2020) whereas for the other possible interaction effects we did not and therefore decided not to include them in our analyses. Effect size is measured using partial Eta<sup>2</sup> that indicates the ratio of variance that is associated with each effect and its error variance. The three datasets are described in more detail as follows. Table 1 presents the sample characteristics of the three datasets.

### Dataset 1

The first dataset was originally designed to analyse domain-specific values in the context of human-animal relationships (Hölker *et al* 2019a,b). In addition to different animal-ethical positions, such as the animal rights approach, the survey also included questions about participants’ involvement in animal protection and their awareness of animals in daily life. The study was conducted as an online survey in August 2017. The dataset contains answers from 1,049 respondents and is approximately representative of the German population as regards the characteristics of sex, age, and education.

### Dataset 2

The second dataset was derived from a study by Schütz *et al* (2020), which investigated how citizens perceive different enriching elements in pig housing. In addition, people’s attitudes towards farm animal protection and their evaluation of current pig husbandry systems were included. Four hundred and fourteen German residents were surveyed online in March 2018, using a standardised questionnaire. Participants were selected using quota sampling with sex, age, place of residence (North, South, East, and West Germany), and school education as quota control criteria based on the distribution in the general population in Germany.

### Dataset 3

The third dataset was originally collected by Winkel *et al* (2019). One thousand and forty-eight German residents were asked about their perceptions of pig stable constructions and management in pig farming. Data were collected online using a standardised questionnaire in September 2018. Participants

**Table 1** Description of demographic characteristics (in %) in the three samples and the German population.

Characteristic	Study 1 (n = 1,049)	Study 2 (n = 414)	Study 3 (n = 1,048)	German population
<i>Sex<sup>a</sup></i>				
Female	50.9	51.9	51.2	50.7
Male	49.1	48.1	48.8	49.3
<i>Age (years)<sup>b</sup></i>				
18–29	13.8	17.1	21.2	16.3
30–39	15.5	14.0	17.7	15.5
40–49	18.1	15.2	18.7	14.7
50–59	18.6	19.6	24.0	19.4
60+	33.9	33.8	18.3	34.2
<i>Place of residence<sup>c</sup></i>				
South <sup>1</sup>	26.9	29.0	27.7	29.1
North <sup>2</sup>	15.4	16.2	13.5	16.1
East <sup>3</sup>	21.5	20.5	20.1	19.5
West <sup>4</sup>	36.1	34.3	38.6	35.3
<i>Pet owners<sup>c</sup></i>	48.7	50.7	50.3	47.0

<sup>a</sup> Statistisches Bundesamt Germany (2019a);

<sup>b</sup> Statistisches Bundesamt Germany (2019b);

<sup>c</sup> Statistisches Bundesamt Germany (2019c);

<sup>1</sup> Bavaria, Baden-Wuerttemberg;

<sup>2</sup> Bremen, Hamburg, Lower-Saxony, Schleswig-Holstein;

<sup>3</sup> Brandenburg, Berlin, Saxony, Saxony-Anhalt, Thuringa, Mecklenburg-Western Pomerania;

<sup>4</sup> Hestia, North Rhine-Westphalia, Rhineland-Palatinate, Saarland.

were selected using quota sampling with sex, age, education, and number of inhabitants at the place of residence according to the German population. The questionnaire also included people's involvement (interest and subjective knowledge) in livestock farming as well as their attitudes towards eating animals that we analysed in the study presented herein.

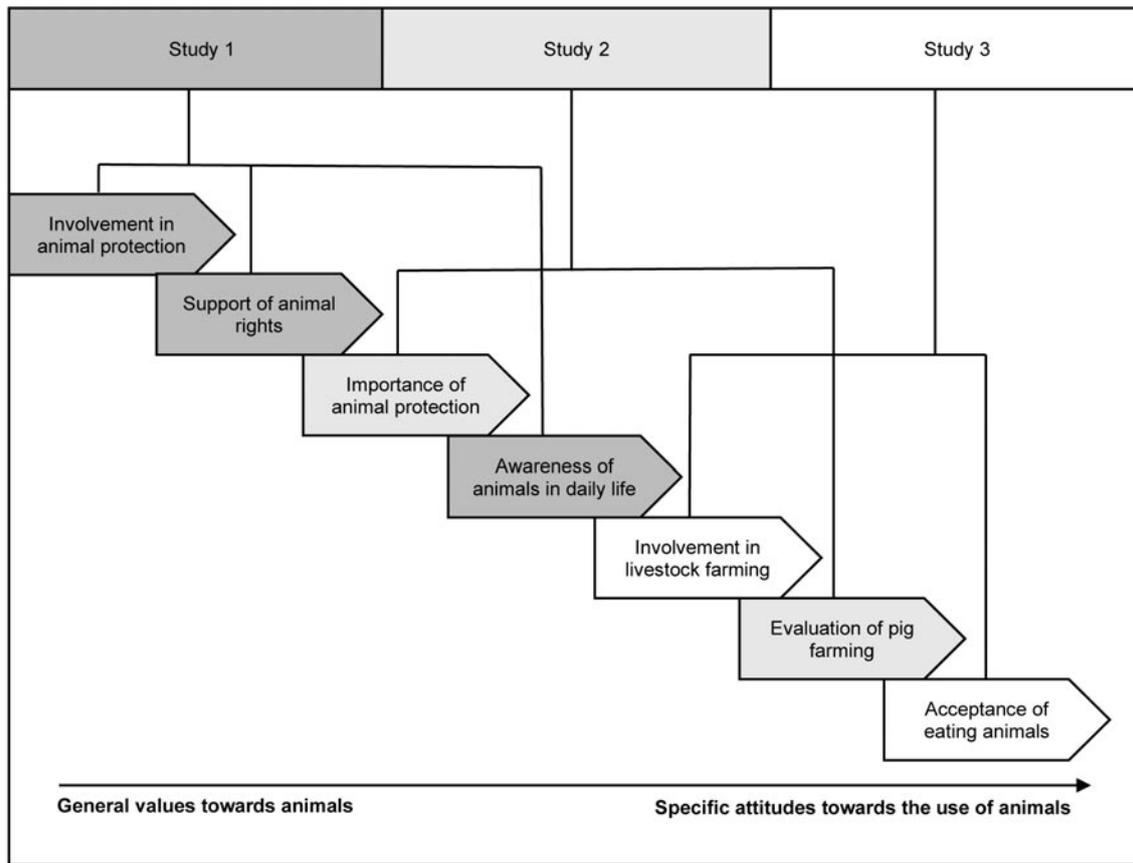
Figure 1 shows the seven constructs that we derived from the three studies described above and that were analysed in our study. The seven constructs range from more general values towards animals, such as involvement in animal protection, on the left of the figure, to more specific attitudes, such as eating animals, on the right. As such, the constructs 'Involvement in animal production', 'Support of animal rights' and 'Awareness of animals in daily life' were derived from dataset 1. 'Importance of animal protection', and 'Evaluation of pig farming' pertain to dataset 2. From dataset 3, the constructs 'Involvement in livestock farming' and 'Acceptance of eating animals' were used. Each construct was built using PCA.

Table S2 shows the results of the PCA including the items that belong to each construct as well as means, standard deviations, and factor loadings. In a further step, we built indices by calculating unweighted means for each construct and then used them as dependent variables in ANOVA.

## Results

The results of our seven multiple-factor ANOVAs performed to test for associations of pet ownership with different values and attitudes towards animals show that pet ownership is related to people's attitudes towards animals (Table 3). The importance differs depending on the specific construct. The strongest relationship can be observed in the case of respondents' general involvement in animal protection. This effect is even stronger than that of age and sex. When attributing certain rights to animals, the association with pet ownership is weaker and similar to the one of sex. When it comes to more specific attitudes, such as the importance of animal protection in agriculture, a link with pet ownership still exists, which is also stronger than age-effects but is slightly outperformed by the effect of sex. A small interaction effect between pet ownership and sex can be observed. Regarding the awareness of animals in daily life, the effect of sex is much stronger, but pet ownership relates to the awareness as well. For people's involvement in livestock farming, the effect of pet ownership decreases, but sex and age do not show any effect. In the most specific attitudes we tested, namely the evaluation of current pig farming and the acceptance of eating animals, the association with pet ownership disappears, and sex has the strongest impact on attitudes among the tested factors.

Figure 1



Attitudes towards (farm) animals derived from the three studies and used as dependent variables in ANOVA.

**Table 3 Multiple-factor ANOVA results analysing the associations of pet ownership, sex, and age with indices on involvement and attitudes towards animals, livestock farming, and eating animals.**

Dependent variables	Corrected model	Constant term	Pet ownership	Sex	Age	Pet ownership × sex	Corr R <sup>2</sup>
Involvement in animal protection	0.134***	0.491***	0.097***	0.018***	0.028***	0.004*	0.13
Support of animal rights	0.101***	0.689***	0.047***	0.048***	0.006*	0.001	0.10
Importance of animal protection	0.123***	0.785***	0.040***	0.046***	0.027**	0.026**	0.12
Awareness of animals in daily life	0.133***	0.523***	0.042***	0.071***	0.029***	0.005*	0.13
Involvement in livestock farming	0.037***	0.543***	0.032***	0.003	0.002	0.000	0.03
Evaluation of pig farming	0.023*	0.464***	0.001	0.017*	0.003	0.002	0.01
Acceptance of eating animals	0.099***	0.437***	0.006*	0.066***	0.009*	0.001	0.10

Displayed are partial Eta<sup>2</sup> values (and corrected R<sup>2</sup> values in the last column).

Asterisks indicate levels according to the seven ANOVAs with \* P ≤ 0.05; \*\* P ≤ 0.01; and \*\*\* P ≤ 0.001.

**Table 4 Predicted means ( $\pm$  SD) from the ANOVA results for pet owners and non-pet owners with regard to involvement, attitudes towards animals, livestock farming, and eating animals.**

Attitude constructs	Predicted means ( $\pm$ SD) for pet owners	Predicted means ( $\pm$ SD) for non-pet owners
Involvement in animal protection <sup>***1,2</sup>	3.85 ( $\pm$ 0.22)	3.25 ( $\pm$ 0.17)
Support of animal rights index <sup>***3</sup>	4.34 ( $\pm$ 0.20)	3.96 ( $\pm$ 0.17)
Importance of animal protection <sup>***4</sup>	4.13 ( $\pm$ 0.27)	3.89 ( $\pm$ 0.16)
Awareness of animals in daily life <sup>***5</sup>	3.66 ( $\pm$ 0.26)	3.18 ( $\pm$ 0.18)
Involvement in livestock farming <sup>***6</sup>	3.24 ( $\pm$ 0.06)	2.92 ( $\pm$ 0.06)
Evaluation of pig farming <sup>*7</sup>	2.89 ( $\pm$ 0.18)	2.85 ( $\pm$ 0.10)
Acceptance of eating animals <sup>*8</sup>	3.00 ( $\pm$ 0.29)	3.23 ( $\pm$ 0.36)

<sup>1</sup> Scale from 1 = 'Not involved' to 5 = 'Very involved';

<sup>2</sup> Scale from 1 = 'Not informed' to 5 = 'Very informed';

<sup>3</sup> Scale from 1 = 'Disagreeing with animal rights' to 5 = 'Agreeing with animal rights';

<sup>4</sup> Scale from 1 = 'Animal protection is not important' to 5 = 'Animal protection is important';

<sup>5</sup> Scale from 1 = 'I do not think about animals in my daily life' to 5 = 'I think about animals in my daily life';

<sup>6</sup> Scale from 1 = 'Little involvement' to 5 = 'High involvement';

<sup>7</sup> Scale from 1 = 'Negative evaluation of livestock farming' to 5 = 'Positive evaluation of livestock farming';

<sup>8</sup> Scale from 1 = 'Against eating animals' to 5 = 'In support of eating animals.'

\*  $P \leq 0.05$ ; \*\*  $P \leq 0.01$ ; and \*\*\*  $P \leq 0.001$ .

**Table 5 Predicted means ( $\pm$  SD) from the ANOVA results for female and male pet owners and non-pet owners with regard to involvement, attitudes towards animals, livestock farming, and eating animals.**

Attitude constructs	Predicted means ( $\pm$ SD) for female pet owners	Predicted means ( $\pm$ SD) for female non-pet owners	Predicted means ( $\pm$ SD) for male pet owners	Predicted means ( $\pm$ SD) for male non-pet owners
Involvement in animal protection <sup>***1,2</sup>	3.99 ( $\pm$ 0.16)	3.32 ( $\pm$ 0.17)	3.67 ( $\pm$ 0.15)	3.19 ( $\pm$ 0.15)
Support of animal rights index <sup>***3</sup>	4.51 ( $\pm$ 0.07)	4.13 ( $\pm$ 0.07)	4.13 ( $\pm$ 0.06)	3.82 ( $\pm$ 0.06)
Importance of animal protection <sup>(female)***; <math>P \geq 0.05</math>; 4</sup>	4.37 ( $\pm$ 0.11)	3.92 ( $\pm$ 0.11)	3.87 ( $\pm$ 0.10)	3.86 ( $\pm$ 0.11)
Awareness of animals in daily life <sup>***5</sup>	3.85 ( $\pm$ 0.15)	3.30 ( $\pm$ 0.15)	3.41 ( $\pm$ 0.13)	3.07 ( $\pm$ 0.14)
Involvement in livestock farming <sup>***6</sup>	3.28 ( $\pm$ 0.04)	2.96 ( $\pm$ 0.05)	3.20 ( $\pm$ 0.03)	2.88 ( $\pm$ 0.04)
Evaluation of pig farming <sup>***7</sup>	2.72 ( $\pm$ 0.06)	2.77 ( $\pm$ 0.06)	3.07 ( $\pm$ 0.05)	2.94 ( $\pm$ 0.06)
Acceptance of eating animals <sup>***8</sup>	2.77 ( $\pm$ 0.10)	2.86 ( $\pm$ 0.11)	3.32 ( $\pm$ 0.08)	3.54 ( $\pm$ 0.09)

<sup>1</sup> Scale from 1 = 'Not involved' to 5 = 'Very involved';

<sup>2</sup> Scale from 1 = 'Not informed' to 5 = 'Very informed';

<sup>3</sup> Scale from 1 = 'Disagreeing with animal rights' to 5 = 'Agreeing with animal rights';

<sup>4</sup> Scale from 1 = 'Animal protection is not important' to 5 = 'Animal protection is important';

<sup>5</sup> Scale from 1 = 'I do not think about animals in my daily life' to 5 = 'I think about animals in my daily life';

<sup>6</sup> Scale from 1 = 'Little involvement' to 5 = 'High involvement';

<sup>7</sup> Scale from 1 = 'Negative evaluation of livestock farming' to 5 = 'Positive evaluation of livestock farming';

<sup>8</sup> Scale from 1 = 'Against eating animals' to 5 = 'In support of eating animals.'

\*  $P \leq 0.05$ ; \*\*  $P \leq 0.01$ ; and \*\*\*  $P \leq 0.001$ .

Table 4 shows the predicted means of the tested dependent variables both for pet owners and non-pet owners. These results indicate that pet owners were more involved in animal protection topics compared to non-pet owners. They further scored higher on the animal rights index than non-pet owners, indicating a greater support for animals to have certain rights, such as physical integrity and dignity. Pet owners attributed slightly greater importance to animal protection, and they

were more aware of animals in their daily life. They also had a greater involvement in livestock farming. When it comes to the evaluation of pig farming, means in both groups were quite similar. However, pet owners were a little more reluctant as regards eating animals.

Table 5 shows the predicted means of the tested dependent variables for female and male pet and non-pet owners. It can be seen that both female as well as male pet owners show

higher scores for involvement in animal protection, support of animal rights, awareness of animals in daily life, involvement in livestock farming, and they accept eating animals less compared to non-pet owners. For the importance of animals in daily life, male pet owners do not differ from male non-pet owners and male pet owners evaluate pig farming slightly more positively than male non-pet owners. For all constructs, female pet as well as non-pet owners score higher compared to male pet and non-pet owners.

We further tested whether pet owners had a greater likelihood of being vegetarian and vegan using cross-tabulation and a Chi-squared test. We did not find such a relationship in any of the three datasets.

## Discussion

In this study, we used three datasets including information on pet ownership to address the research question. Basing our analysis on three different datasets runs the risk of influencing our results because they are based on different samples. However, the three samples are representative in terms of age, sex and education for the German population, large in sample size, and have similar shares of pet owners. Therefore, we would argue that the results of the three studies are quite comparable.

We show that pet ownership is associated with different attitudes towards animals. This is in line with previous findings (eg Clark *et al* 2016) and supports the so-called ‘pets as ambassadors’ hypothesis, which suggests that contact with pets promotes positive attitudes towards other animal species (Serpell & Paul 1994). Considering the increasing number of pet owners in many OECD countries, such as Germany, pet ownership might be considered to be one of the drivers of a changing human-animal relationship in society. This trend towards pet ownership received an additional push during the COVID-19 pandemic in 2020, leading to almost every second household in Germany having at least one companion animal (ZZF 2021). However, we found that the relation of pet ownership with attitudes differed depending on the specificity of the attitude under discussion. It should be noted that effect sizes in our study were small to medium. Our findings indicate that pet ownership is most strongly related to general values towards animals, such as the general involvement in animal protection. Accordingly, Sneddon *et al* (2016) suggested that concerns for animal welfare should be considered as personal values that transcend specific situations rather than a situation-specific attitude. Subsequently, Lee *et al* (2019) proposed including animal welfare as a personal value in the Schwartz Value Scale as a sub-dimension of universalism. People’s score on the universalism-animals value is related to pet ownership in the sense that those individuals identified as pet owners attribute a higher importance to this value than non-pet owners (Lee *et al* 2019). Following this approach and conceptualising concerns for the treatment and use of animals as broad and stable values that guide people’s attitudes, perceptions, and behaviour helps clarify what we observed in our data. If concern for animals is a general personal value that is related to pet ownership, it is

likely that pet ownership impacts general attitudes towards animals as well as their rights and protection.

However, the impact of pet ownership decreases the more specific these attitudes get, such as the involvement in livestock farming, the evaluation of current husbandry systems, and attitudes towards eating animals. This might be an indicator that the impact of personal values towards animals associated with pet ownership is less strong in the case of more specific attitudes and behaviour (Hölker *et al* 2019c). We could not find a relationship between pet ownership and avoiding meat in the diet, as has been shown by others (eg Dodd *et al* 2019) which might be partly attributable to the sample used by Dodd *et al* (2019) which constitutes 92% female participants who have higher prevalence of being vegetarian/vegan whereas our sample is balanced in terms of sex. One further explanation might be grounded in the attitude-behaviour gap that states that attitudes towards a topic do not translate directly into behaviour (Ajzen 2005). This gap is discussed as being comparably large for animal welfare attitudes and meat consumption due to, eg, cognitive dissonance resulting from the dislike of killing animals but liking the taste of meat, which leads to a repression of these thoughts. In terms of the evaluation of current husbandry systems as well as in the case of attitudes towards eating animals, sex has a stronger influence than pet ownership. Women are more concerned about animal welfare in current housing systems (Clark *et al* 2016) and are more often vegetarians compared to men (Pfeiler & Egloff 2018). Our results are in line with these findings.

People’s attitudes towards animals and animal use are associated, of course, not only with experiences with pets, sex, and age (Driscoll 1992; Wells & Hepper 1995, 1997; Maria 2006; McKendree *et al* 2014; Su & Martens 2018; Martens *et al* 2019) but depend also on various other factors. For general attitudes towards animals these include, for example, ethical ideologies and religious affiliation (Driscoll 1992; Su & Martens 2018). In the case of people’s attitudes towards livestock production and farm animal welfare, stakeholder affiliation, specific knowledge about the topic, or place of residence (urban or rural) are also relevant (Vanhonacker *et al* 2007, 2008; Tuytens *et al* 2010; Weible *et al* 2016) but were not included in the studies we analysed.

In addition, we did not include information on relationship quality experienced by pet owners nor the importance of the pet in their lives. The bond with the animal experienced by humans might also be associated with views towards other animals, such as farmed ones. Future studies could include such factors for further analysing their impact on attitudes towards animals in relation to pet ownership.

## Animal welfare implications and conclusion

Our results confirm that pet ownership is related to values towards animals and demonstrate that this relationship differs in strength depending on the specificity of the attitudes. Overall, effect sizes are small to medium indicating only moderate associations in real life settings. We need to state

that we cannot make any inference on causality from our data in the sense that we do not know whether pet ownership influences attitudes towards animals or whether attitudes towards animals influence likelihoods of becoming a pet-owner — both directions are reasonable. Either way, the increasing number of households with pets shows that how societies view farm animals and how individuals want them to be treated is likely to change further. Although these values do not directly translate into a changed consumption behaviour, such as vegetarian diets, they will likely influence public debates on the treatment of animals and animal welfare — especially in animal farming. Also, the way we treat pets continues to change. Pets accompany people, sometimes taking on a role similar to that of children, and the market for pet products is growing. Against this background, it is reasonable to expect that the long-term impact on the animal welfare demands in animal husbandry will further increase.

### Declaration of interest

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