

## Citizen Attitudes to Farm Animals in Finland: A Population-Based Study

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**Abstract** Citizen attitudes and opinions form an important driving force for improvements in the ethical status of farm animals in society. Hence, it is important to understand how attitudes to farm animals vary in society and what factors, mechanisms and social processes influence the development of these attitudes. In this study we examine the relative importance of socio-demographic background, animal related experiences and social-equality attitudes in the formation of attitudes to farm animals in Finland. The research is based on a nationwide survey (n = 1890). Our research findings suggest that female gender, young age, urban residency, a non-farming background and social-equality attitudes are linked to greater concern for farm animals. A farming background, valuing social equality, and gender have the strongest connections to farm animal attitudes, followed by age and place of residence. Having a companion animal and education level have a relatively modest connection to attitudes to farm animals. In order to accumulate comparative evidence of social-group differences in attitudes to farm animals, further research should continue to develop improved indicators for attitudes to farm animal welfare and rights. Moreover, explanations for social-group differences in citizen attitudes to farm animals should be subjected to further empirical testing.

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## Introduction

Citizen attitudes toward farm animal welfare and rights affect the ways in which farm animals are treated in society (cf. Serpell 2004). Evidently, the relationship between attitudes and behaviors is complex, and citizens' attitudes do not directly translate into their consumption behavior, voting behavior or civic activity. For instance, although people may feel concerned for farm animals, the availability of products that meet their ethical standards may be limited (Lusk 2011). However, the attitudes and beliefs of the general public do influence the level of political pressure to improve the situation of farm animals and the level of potential consumer demand for ethical food products (Deemer and Lobao 2011; Serpell 2004; Lusk 2011). In order to promote improvements in the moral, political and legal status of farm animals, it is important to understand how attitudes to farm animals vary in society and which factors, mechanisms and social processes influence the development of these attitudes (Vanhonacker and Verbeke 2014).

In recent years, survey-based research on citizen attitudes to farm animals has increased. Although many of these studies have been descriptive, exploring attitudes to farm animal welfare and rights in the population at large, a growing number of studies have started examining social differences in citizens' perceptions of animal farming and the factors behind these differences (Boogaard et al. 2006; Deemer and Lobao 2011; Kendall et al. 2006; Musto et al. 2014; Prickett et al. 2010; Vanhonacker et al. 2007, 2009). Since studying citizen views on animal farming is a new research field, there are no standardized and tested measures for assessing attitudes to farm animals, and a wide range of attitudinal measures have been employed in different studies (Deemer and Lobao 2011). Consequently, research findings concerning social-group differences in citizen views on farm animals are not directly comparable across different studies. Moreover, previous studies have tended to examine the direction of the relationship between attitudes to farm animals and various background variables, giving less attention to the strength of these relationships. Yet in order to assess the importance of different factors in the formation of attitudes to farm animals, it is essential to examine how strongly these factors are linked to attitudes towards animals. Likewise, the geographical coverage of studies on citizen views on farm animal welfare has mostly been limited to North America (Deemer and Lobao 2011; Kendall et al. 2006; Prickett et al. 2010) and Western and Southern Europe (Boogaard et al. 2006; Cohen et al. 2012; Frewer et al. 2005; Leenstra et al. 2011; Vanhonacker et al. 2007, 2009; Gracia 2013; María 2006; Musto et al. 2014; Vecchio and Annunziata 2012). International comparison of citizen attitudes to farm animals requires these attitudes to be investigated in other national settings too.

In this article we investigate citizen attitudes to farm animals in Finland. We analyze the direction and the strength of the relationship between attitudes to farm animals and socio-demographic variables, animal-related experiences and societal

attitudes. Based on this analysis, we discuss the relative importance of factors that affect attitudes to farm animals. By documenting the direction and the strength of the relationship between attitudes to farm animals and various background variables, our study facilitates the development of explanatory models for the social formation of attitudes to farm animals. Furthermore, our study contributes to the accumulation of global comparative evidence of citizen views on farm animals by extending the geographical coverage of the research on attitudes to animals to Northern Europe.

## Indicators of Attitudes to Farm Animals

Farm animal welfare and rights are complex phenomena, and consequently, it is challenging to develop indicators that measure citizen attitudes to them. Animal welfare, as a concept describing the quality of life of an animal, is a wide and multidimensional notion which consists of various factors, such as negative and positive emotions, physical health and natural behavior of animals (e.g. Broom and Fraser 2007; Fraser 2008; Keeling et al. 2011). For instance, housing conditions, outdoor access, feeding, breeding, and human–animal interactions at farms affect different aspects of animal welfare in complex ways (Appleby et al. 2011). Research can focus on attitudes to particular farming practices, particular animal species or specific dimensions of animal welfare, and develop indicators for these attitudes (e.g. Vanhonacker et al. 2009). However, most studies have explored attitudes to farm animal welfare as a broader concept. The usual practice has been to include a measurement for general concern regarding farm animal welfare or for the assessment of the current state of farm animal welfare (Heleski et al. 2006; María 2006; Vanhonacker et al. 2007). Likewise, summated attitudinal scales for animal treatment or animal agriculture concerns have been developed from questions that gauge general attitudes to respecting animal welfare, the regulating of animal welfare, and the importance of animal welfare as an ethical issue (Deemer and Lobao 2011; Kendall et al. 2006). Since citizens are not familiar with many specific animal farming practices, they may not have developed any coherent attitudes to these practices, and hence, the proportion of non-responses can increase (Deemer and Lobao 2011). Therefore, studying attitudes to specific farming practices or to particular dimensions of farm animal welfare requires the citizens' knowledge level to be taken into account.

Ethical questions surrounding animal farming do just not include questions related to animal welfare, but also questions related to animal rights (McCausland 2014; Pluhar 2010). Animal welfare ethics focuses on the quality of life of animals used by humans, but does not question the use and killing of animals for human benefit (Garner 2013). Animal rights perspectives question the exploitation and subordination of animals as well as the confinement and killing of animals for human benefit (Francione 2008; Donaldson and Kymlicka 2011; Regan 1983). Hence, citizen views on farm animal rights cover attitudes to animal killing, the value of animal life, animal captivity and freedom, the property status of animals, the inherent worth of animals, and the personhood of animals. Although research on

attitudes to animals in general has covered issues of animal rights (Phillips et al. 2010, 2012), research on attitudes to farm animals has tended to focus mostly on animal welfare. In this study we investigate citizen attitudes toward farm animal welfare as a general concept. In addition to attitudes to animal welfare, we also explore citizen views on the value of animal life.

## Social Formation of Attitudes to Farm Animals

Previous studies have evaluated the link between attitudes to farm animals and socio-demographic variables, personal animal-related experiences and political attitudes or values (Deemer and Lobao 2011; Kendall et al. 2006; María 2006; Musto et al. 2014; Prickett et al. 2010; Vanhonacker et al. 2007, 2009). Socio-demographic variables that potentially are associated with views on farm animals include gender, place of residence, age, level of education, and socioeconomic status. Regarding gender, previous research suggests that women are more concerned about farm animal welfare than men (Deemer and Lobao 2011; Kendall et al. 2006; María 2006; Musto et al. 2014; Prickett et al. 2010; Vanhonacker et al. 2007, 2009). However, these studies have not typically discussed how strong the link between gender and concern for farm animal welfare is. A review of 18 survey studies on animal use suggests a moderate gender difference in attitudes to animal use, with most effect sizes in the medium range (mean Cohen's  $d = 0.49$ ) (Herzog 2007). The review suggests that the magnitude of the gender difference varies depending on the type of human–animal interaction being investigated (Herzog 2007). For instance, while in animal activism or recreational hunting gender differences are large, in attitudes to animal use gender differences appear to be moderate (Herzog 2007). However, since the review included studies of attitudes to various uses of animals, and not solely attitudes to animal farming, and since the majority of studies were based on student samples, this finding is only indicative as regards citizens' perceptions of farm animal issues.

Regarding other socio-demographic variables, studies indicate that urban residents are more concerned for farm animal welfare than those living in rural areas (Deemer and Lobao 2011; Boogaard et al. 2006; Kendall et al. 2006; Musto et al. 2014; Vanhonacker et al. 2010) and that younger people are more concerned with farm animal welfare than older people (Deemer and Lobao 2011; Kendall et al. 2006; María 2006; Vanhonacker et al. 2007). However, the strength of the link between these variables and attitudes to farm animals has not been discussed.

The findings of studies on the association between educational level and attitudes to farm animals have been inconsistent. Some studies suggest that those with a lower level of education are more concerned about farm animal welfare than those with a higher level of education (Kendall et al. 2006; Prickett et al. 2010), while other studies suggest the reverse (Vecchio and Annunziata 2012; Musto et al. 2014) or fail to find any association between these variables (Deemer and Lobao 2011; Vanhonacker et al. 2007). The school system has a central role in shaping attitudes, behavior and worldviews, but both empirical and theoretical exploration of the link between education and views on farm animals has thus far been limited.

Alongside socio-demographic background, personal experiences with animals shape attitudes to farm animals. In particular, previous studies suggest that having a companion animal promotes positive attitudes toward animals in general and greater concern for farm animal welfare (Boogaard et al. 2006; Daly and Morton 2009; Kendall et al. 2006; Paul 2000). An attachment to one's animal companion creates feelings of affinity that can extend to other nonhuman animals (Paul and Serpell 1993). Moreover, living with a companion animal can encourage people to develop a more nuanced understanding of the emotions and mental capacities of animals (Morris et al. 2012; Walker et al. 2014). Research also suggests that a farming background, in terms of living or having grown up on a farm, is associated with a weakened concern for farm animal welfare (Kendall et al. 2006; Vanhonacker et al. 2007).

Alongside socio-demographic background and personal animal-related experiences, societal and political attitudes are also associated with attitudes to farm animals (Deemer and Lobao 2011). Studies suggest a positive link between human-directed empathy and animal-directed empathy, human-egalitarian views and species-egalitarian views, and human welfare concerns and animal welfare concerns (Deemer and Lobao 2011; Paul 2000). In particular, Deemer and Lobao (2011) found evidence that people who express greater tolerance for social out-groups and support economic equality are more concerned about farm animal welfare. Moreover, their study suggests that concern for farm animal welfare coincides with greater concern for human welfare, as indicated by the valuing of humane labor conditions and fair trade. Psychological studies indicate that prejudicial attitudes toward human out-groups are connected to negative attitudes toward nonhuman animals (Dhont et al. 2014). Hence, it seems that people who value egalitarian relations among humans tend also to value more egalitarian relations between humans and nonhuman animals, suggesting that other-oriented concerns are not restricted by species-boundaries.

## Materials and Methods

### Survey Data Collection

This research uses data from a nationwide mail survey of Finnish people, which was administered April–July 2010. The purpose of the survey was to investigate citizen attitudes toward farm animal welfare, meat eating and the moral value of animals. The address data ( $n = 4000$ ) was obtained as a random sample from the Population Register Centre of Finland, which maintains a national register of all Finnish citizens and foreign citizens residing permanently in Finland.<sup>1</sup> The sampling frame was 18–75-year-old individuals, living in mainland Finland, and with Finnish as their first language.<sup>2</sup> A raffle of a 200-euro gift voucher to a department store

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<sup>1</sup> Sampling includes only those who have a permanent address in Finland and who have not forbidden the disclosure of their information.

<sup>2</sup> Ethnicity was not measured in our questionnaire. Finland's population is relatively homogenous as it consists mostly (90.4 %) of people with Finnish as their first language, followed by Swedish-speaking people (5.4 %) and people from other language groups (4.2 %) (year 2010) (Statistics Finland 2014a). Likewise, only 4.8 % of Finland's population are of foreign origin (Statistics Finland 2012).

provided a small incentive for people to respond. A reminder letter including the questionnaire form was sent twice to people who had not responded. We received 1890 adequately completed forms, and the final response rate was 47.4%.<sup>3</sup> In Finland nowadays a response rate of around 50 % or under is common (Räsänen and Sarpila 2013). The authors formulated the questions with advice from experts in animal welfare science, animal ethics and agro-environmental studies. The final questionnaire form was 11 pages long with a feedback form, and included 24 questions.

## Dependent Measures

### *Farm Animal Welfare Evaluation*

As we already noted, in previous studies it has been typical to include a measurement for general concern regarding farm animal welfare or for the assessment of the current state of farm animal welfare. In this study, we include a measurement for the evaluation of the current state of farm animal welfare in Finland. The *welfare evaluation scale* is a scaled variable based on eight items. Respondents were asked to evaluate the current state of animal welfare in eight animal production lines in Finland (including laying hens, broiler chickens, turkeys, pigs, farmed fish, beef cattle, dairy cows and sheep). Items were measured on a five-point scale ranging from “very good” (1) to “very poor” (5). A reliability test for these items yields a Cronbach’s  $\alpha$  of 0.923. The variable is reversed (1 = very poor, 5 = very good), so that higher scores on the scale indicate a more positive evaluation of farm animal welfare.

### *Trust in Prevalent Animal Production*

Three remaining attitudinal measures (trust in prevalent animal production, behavioral freedom and valuing animal life) were created using 5-point items, ranging from “fully agrees” to “fully disagrees”. To confirm that items load on a single component for each attitudinal measure, principal component analysis with varimax rotation was used. Items were re-coded as needed so that higher scores on the scale indicate a higher valuation of the behavioral freedom and life of animals and a higher trust in prevalent animal production, respectively. As the variables are scaled, their possible scores range from one to five.

Trust in prevalent animal production scale covers attitudes to prevalent animal production and the level of trust in knowledge of animal producers, technological development and customary farming practices in terms of animal welfare. The items include the following six items: “Animal producers are well informed of the welfare needs of animals”, “Animals can be looked after well on large farms because of technological developments”, “When an animal eats and produces well, it also fares

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<sup>3</sup> We removed 15 persons from the original sample as they were unreachable due to moving, death and other force majeure reasons. Hence, the number of people sampled is 3985, and this number is used in the calculation of the response rate.

well”, “Nowadays farm animals have sufficient space to move around”, “Nowadays the longevity of animals is sufficient at farms”, and “When the housing conditions of pigs and poultry are adequate, it is not necessary to provide them with outdoor access”. A reliability test for these items indicates high reliability (Cronbach’s  $\alpha = 0.789$ ). Higher scores on the scale indicate a higher trust in prevalent animal production to provide adequate animal welfare.

### *Behavioral Freedom Scale*

This variable includes five items measuring views on behavioral restriction and species-specific behavior of animals. The items include the following statements: “All farm animals should be given the opportunity to carry out species-specific behavior”, “Farm animals can become depressed in inadequately enriched living conditions”, “Calves should have enough space to run and play with each other”, “Calves should not be separated from their mothers right after their birth” and “Keeping laying hens in cages should be banned for animal welfare reasons”. A reliability test for these items is high (a Cronbach’s  $\alpha = 0.758$ ). Higher scores on the behavioral freedom scale indicate a higher valuation of the behavioral freedom of animals.

### *Valuing Animal Life Scale*

This scale measures attitudes toward the longevity of animals as well as toward killing animals for production optimization reasons. The scale also includes an item concerning the minimization of animal slaughtering through modest consumption of meat. The scale is based on three statements: “Young animals (e.g. calves, fattening pigs and pullets) should not be killed for food production reasons”, “Dairy cows and sows should not be killed solely for reasons of low productivity”, and “Meat products should be consumed in low quantities because their production requires animals to be slaughtered”. Again, the reliability test for these items is relatively high (Cronbach’s  $\alpha = 0.719$ ). Higher scores on the scale indicate a higher valuation of the life and longevity of agricultural animals.

## **Independent Measures**

### *Socio-demographic Variables*

We analyzed correlations between independent variables and various socio-demographic variables in order to identify those variables that are connected to attitudes to farm animals. Gender, age, education, and place of residence had a modest correlation with the dependent variables. Being employed, living with a partner or having children had very low (less than 0.1) or no correlation with the dependent variables, so they were not included in the further analysis.

Apart from age, all socio-demographic variables are categorical and included in the regression analysis as dummy variables, coded 1/0. Gender was coded as 0 = male (a reference group) and 1 = female. Age was measured in years. The

place of residence was based on the municipalities of the respondents that were included in the Population Register Centre data. We categorized municipalities according to the number of residents, which we gathered from the statistics of the Population Register Centre (2010). The place of residence includes four categories: rural municipality (fewer than 10,000 inhabitants) (a reference group), a small town or municipality (10,000–49,999 inhabitants), a medium-sized town (50,000–190,000 inhabitants) and a large town or city (over 190,000 inhabitants). Education is divided into three categories measuring the highest educational level attained by the respondent: basic education (compulsory basic education, such as comprehensive school or lower), intermediate education (vocational school or upper secondary school) and tertiary education (including college, polytechnic, university and doctorate level education).

### *Animal-Related Experiences*

We examined two animal-related experiences. Firstly, respondents were asked whether they have any companion animals in the household. Affirmative responses were coded as 1, negative responses as 0. Secondly, respondents were asked about their personal contact with animal farming with four options (lives/has lived on a farm with agricultural animals, has visited a relative's farm with agricultural animals, has otherwise visited a farm with agricultural animals, has never visited a farm with agricultural animals). Those who responded that they grew up or are currently living on a farm that has agricultural animals were coded as 1 and all others as 0.

### *Human-Equality Attitudes*

The *social equality scale* is based on three items. Respondents were asked how much they value gender equality, social justice and the rights of sexual minorities. The possible scores for these items range from 1 (respondent values very much) to 5 (does not value at all). A reliability test for these items yields a Cronbach's  $\alpha$  of 0.642. In the analysis, the scale is reversed and the higher scores on the scale indicate a higher valuation of social equality.

### **Analysis Techniques**

Multiple Ordinary Least Squares (OLS) regression was used to analyze the association between variables. The method was selected as the dependent variables are interval variables and as the independent variables include both interval variables and ordinal or nominal variables that can be transformed into dummy variables (Tabachnick and Fidell 2007). The method allows the analysis of the strength of association between the dependent and independent variables when the effect of other variables is controlled (Tabachnick and Fidell 2007). All the regression models met the assumptions of the regression analysis regarding the multicollinearity and singularity of independent variables as well as the normality, linearity and homoscedasticity of residuals (Tabachnick and Fidell 2007). There was



no singularity between independent variables because none of them was a combination of two or more of other variables. Likewise, the independent variables did not correlate strongly with each other. The maximum correlation between the independent variables was 0.364, and in the collinearity statistics the minimum tolerance level was 0.530. In all models the residual distributions were normal, linear and homoscedastic. We also examined outliers and found that they were not based on any systematic errors with data collection. Hence, outliers were not removed from the analysis.

The linear connection between the dependent and independent variables was tested using  $F$  and  $t$  tests. We report coefficients of the regression equations in both standardized (Beta) and non-standardized ( $\beta$ ) form. In addition to this, we report adjusted  $R^2$  coefficients for each model, which describe the total variances accounted for the independent variables. The changes in  $R^2$  describe how much the explanatory shares of the models change when the given independent variable is added to the model containing all the other independent variables. These coefficients enable us to compare the relative strengths of the independent variables with each other.

## Results

### Descriptive Analysis

Table 1 shows descriptive statistics for all variables. Women comprise 56 % of respondents, and the mean age is 50. Around a third of respondents have tertiary education, and around a fifth live in large towns or cities. About 40 % have a companion animal in the household, and around a third currently live or grew up on a farm with agricultural animals.

The survey sample was evaluated against the population statistics of Statistics Finland and the Population Register Centre in terms of main socio-demographic variables. Table 2 shows that there are 6 % more women in the survey data than in the population data. The youngest age group is underrepresented by 7.8 %, the difference is small in the mid-age group, and the oldest age group is overrepresented by 9.2 %. A more detailed examination shows that women are over-represented in younger age groups, whereas there is no noticeable gender difference in the oldest age group (56–75 years-old) (data not shown in the table). People with basic education and tertiary education are somewhat overrepresented in the data (3 and 1.4 %), while people with intermediate education are somewhat underrepresented (4.4 %). The regional distribution of the survey data is approximately even, with only residents from Southern Finland slightly (2.5 %) underrepresented. The survey data is also distributed well in terms of place of residence. All in all, the survey data is slightly skewed as regards age and gender, with women over-represented and younger people, particularly younger men, under-represented in the sample. There are also small differences in terms of educational level.

**Table 1** Descriptive statistics for all variables

|  | % or M | n    | SD    |
|--|--------|------|-------|
| <i>Dependent variables</i>             |        |      |       |
| Farm animal welfare evaluation         | 3.37   |      | 0.78  |
| Trust in prevalent animal production   | 3.14   |      | 0.78  |
| Behavioral freedom                     | 4.19   |      | 0.67  |
| Valuing animal life                    | 3.02   |      | 1.03  |
| <i>Socio-demographic variables</i>     |        |      |       |
| Gender                                 |        |      |       |
| Female                                 | 56.0   | 1058 |       |
| Male                                   | 44.0   | 831  |       |
| Years of age                           | 49.9   |      | 15.59 |
| Place of residence                     |        |      |       |
| Rural municipality                     | 21.0   | 397  |       |
| Small town/municipality                | 32.3   | 610  |       |
| Medium-sized town                      | 26.5   | 500  |       |
| Large town/city                        | 20.3   | 383  |       |
| Education                              |        |      |       |
| Basic                                  | 24.7   | 462  |       |
| Intermediate                           | 41.1   | 769  |       |
| Tertiary                               | 34.3   | 642  |       |
| <i>Animal-experiential variables</i>   |        |      |       |
| Companion animal                       |        |      |       |
| With companion animal                  | 39.3   | 719  |       |
| Other                                  | 60.7   | 1111 |       |
| Farming background                     |        |      |       |
| Currently lives or has lived in a farm | 34.2   | 642  |       |
| Other                                  | 65.8   | 1236 |       |
| <i>Attitude variables</i>              |        |      |       |
| Social equality                        | 4.01   |      | 0.72  |

## Regression Analysis

Tables 3 and 4 present regression coefficients, adjusted  $R^2$  and changes in  $R^2$  based on multiple OLS-regression. Regression coefficients describe the relationship between the dependent and independent variables when the effect of other variables has been controlled in the regression solution.

### *Farm Animal Welfare Evaluation*

Table 3 presents the OLS-regression models for the farm animal welfare evaluation. As noted, this variable measures how people evaluate the current state of animal welfare in eight animal production lines in Finland. Higher scores on the scale indicate a more positive evaluation of farm animal welfare. After statistical

**Table 2** Survey participant demographics in comparison with national population statistics (2010)

|  | Survey (%) | Survey (n) | Population (%) <sup>a</sup> | Population (N) |
|--|------------|------------|-----------------------------|----------------|
| <b>Gender</b>                            |            |            |                             |                |
| Female                                   | 56.0       | 1058       | 50.2                        | 1,765,641      |
| Male                                     | 44.0       | 831        | 49.8                        | 1,752,873      |
| <b>Age (years)</b>                       |            |            |                             |                |
| 18–35                                    | 22.7       | 428        | 30.5                        | 1,072,495      |
| 36–55                                    | 35.0       | 662        | 36.5                        | 1,282,693      |
| 56–75                                    | 42.3       | 799        | 33.1                        | 1,163,326      |
| <b>Education<sup>b</sup></b>             |            |            |                             |                |
| Basic                                    | 24.7       | 462        | 21.7                        | 753,608        |
| Intermediate                             | 41.1       | 769        | 45.5                        | 1,581,537      |
| Tertiary                                 | 34.3       | 642        | 32.9                        | 1,143,153      |
| <b>Place of residence</b>                |            |            |                             |                |
| Rural municipality (<10,000 inhabitants) | 21.0       | 397        | 19.5                        | 1,046,567      |
| Small town/municipality (10,000–49,999)  | 32.3       | 610        | 32.9                        | 1,764,053      |
| Medium-sized town (50,000–190,000)       | 26.5       | 500        | 24.4                        | 1,307,825      |
| Large town/city (over 190,000)           | 20.3       | 383        | 23.1                        | 1,240,110      |
| <b>Region<sup>c</sup></b>                |            |            |                             |                |
| Lapland                                  | 3.7        | 69         | 3.7                         | 129,692        |
| Northern Finland                         | 10.4       | 197        | 9.3                         | 325,969        |
| Western and Inland Finland               | 21.7       | 411        | 21.8                        | 768,200        |
| Eastern Finland                          | 12.6       | 239        | 11.5                        | 402,898        |
| Southwest Finland                        | 13.4       | 254        | 13.2                        | 463,043        |
| Southern Finland                         | 38.1       | 720        | 40.6                        | 1,428,712      |

<sup>a</sup> Population statistics are derived from Statistics Finland online databases (Statistics Finland 2014b, c), except for the place of residence, which is based on the data of Population Register Centre (2010). Variables were selected so that the population data is equal to the population of the survey: year 2010, mainland Finland, 18–75 year old people with Finnish as their first language. In the case of education, the population statistics and survey population are not fully equivalent: in the Statistics Finland data the age group is 20–69 years and the population includes all language groups, not only Finnish-speakers. The Population Register Centre data includes the full population of the municipalities, including all age groups and language groups

<sup>b</sup> The Statistics Finland educational categories are as follows: basic education, upper secondary/intermediate, lowest level tertiary, lower level tertiary, higher level tertiary and doctorate level (Statistics Finland 2014c). We combined tertiary levels of education and doctorate level into a single category of tertiary education

<sup>c</sup> Regions are categorized according to Finland's regional state administrative agencies

adjustments, women and people living in urban areas evaluate the current state of farm animal welfare more negatively than men and people living in rural municipalities. Older people and people with a farming background tend to assess the current farm animal welfare situation more positively than younger people and people who are not from farms. Valuing social equality is negatively associated with

**Table 3** OLS regression models for farm animal welfare evaluation and trust in prevalent animal production, adjusted coefficients

|  | Farm animal welfare evaluation |       |                       | Trust in prevalent animal production |       |                       |
|--|--------------------------------|-------|-----------------------|--------------------------------------|-------|-----------------------|
|  | $\beta$                        | SE    | R <sup>2</sup> change | $\beta$                              | SE    | R <sup>2</sup> change |
| <i>Socio-demographic variables</i>     |                                |       |                       |                                      |       |                       |
| Gender (male = 0)                      | -0.128***                      | 0.036 | 0.006                 | -0.130***                            | 0.036 | 0.006                 |
| Years of age                           | 0.006***                       | 0.001 | 0.013                 | 0.007***                             | 0.001 | 0.017                 |
| Place of residence                     |                                |       | 0.009                 |                                      |       | 0.012                 |
| Rural municipality (ref. group)        | -                              | -     | -                     | -                                    | -     | -                     |
| Small town/municipality                | -0.113*                        | 0.049 | -0.069*               | -0.104*                              | 0.049 | -0.063*               |
| Medium-sized town                      | -0.125*                        | 0.052 | -0.073*               | -0.139**                             | 0.052 | -0.080**              |
| Large town/city                        | -0.235***                      | 0.056 | -0.124***             | -0.278***                            | 0.056 | -0.145***             |
| Education                              |                                |       | 0.003                 |                                      |       | 0                     |
| Basic (ref. group)                     | -                              | -     | -                     | -                                    | -     | -                     |
| Intermediate                           | 0.081                          | 0.047 | 0.052                 | 0.003                                | 0.047 | 0.002                 |
| Tertiary                               | -0.002                         | 0.049 | -0.001                | -0.017                               | 0.049 | -0.011                |
| <i>Animal-related experiences</i>      |                                |       |                       |                                      |       |                       |
| Companion animal (non-owner = 0)       | -0.077*                        | 0.036 | -0.049*               | -0.117**                             | 0.036 | -0.074**              |
| Farming background (no background = 0) | 0.245***                       | 0.040 | 0.151***              | 0.236***                             | 0.040 | 0.144***              |
| <i>Societal attitudes</i>              |                                |       |                       |                                      |       |                       |
| Social equality                        | -0.087**                       | 0.025 | -0.081**              | -0.111***                            | 0.025 | -0.103***             |
| Constant                               | 3.5                            |       | 3.385                 |                                      |       |                       |
| Adjusted R <sup>2</sup>                | 0.096                          |       | 0.117                 |                                      |       |                       |

$\beta$  unstandardized coefficients, *Beta* standardized coefficients

Linear OLS-regression; *T* test: \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

**Table 4** OLS regression models for behavioral freedom and valuing animal life, adjusted coefficients

|  | Behavioral freedom |       |                       | Valuing animal life |       |                       |
|--|--------------------|-------|-----------------------|---------------------|-------|-----------------------|
|  | $\beta$            | SE    | R <sup>2</sup> change | $\beta$             | SE    | R <sup>2</sup> change |
| <i>Socio-demographic variables</i>     |                    |       |                       |                     |       |                       |
| Gender (male = 0)                      | 0.194***           | 0.031 | 0.019                 | 0.299***            | 0.049 | 0.019                 |
| Years of age                           | 0.003**            | 0.001 | 0.004                 | -0.004**            | 0.002 | 0.003                 |
| Place of residence                     |                    |       | 0.001                 |                     |       | 0.003                 |
| Rural municipality (ref. group)        | -                  | -     |                       | -                   | -     |                       |
| Small town/municipality                | 0.021              | 0.042 |                       | 0.099               | 0.067 |                       |
| Medium-sized town                      | -0.025             | 0.044 |                       | 0.060               | 0.070 |                       |
| Large town/city                        | 0.039              | 0.048 |                       | 0.177*              | 0.076 |                       |
| Education                              |                    |       | 0.005                 |                     |       | 0.021                 |
| Basic (ref. group)                     | -                  | -     |                       | -                   | -     |                       |
| Intermediate                           | -0.086*            | 0.040 |                       | -0.264***           | 0.064 |                       |
| Tertiary                               | -0.130**           | 0.042 |                       | -0.429***           | 0.067 |                       |
| <i>Animal-related experiences</i>      |                    |       |                       |                     |       |                       |
| Companion animal (non-owner = 0)       | 0.150***           | 0.031 | 0.011                 | 0.148**             | 0.049 | 0.005                 |
| Farming background (no background = 0) | -0.193***          | 0.034 | 0.015                 | -0.238***           | 0.055 | 0.010                 |
| <i>Societal attitudes</i>              |                    |       |                       |                     |       |                       |
| Social equality                        | 0.260***           | 0.021 | 0.071                 | 0.213***            | 0.034 | 0.020                 |
| Constant                               | 2.971              |       | 2.406                 |                     |       |                       |
| Adjusted R <sup>2</sup>                | 0.147              |       | 0.093                 |                     |       |                       |

$\beta$  unstandardized coefficients, Beta standardized coefficients

Linear OLS-regression; T test: \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

farm animal welfare evaluation. Having a companion animal has only a minor connection to farm animal welfare evaluation, while education level is not connected to this attitudinal variable. Regression coefficients tend to be relatively low, indicating a modest association between farm animal welfare evaluation and the independent variables. The variables explain 9.6 % of the variance in farm animal welfare evaluation. Changes in  $R^2$  indicate that a farming background, age and place of residence explain the most of the variance in the variable.

#### *Trust in Prevalent Animal Production*

As Table 3 shows, older people and people with farming backgrounds express more trust in prevailing animal production, while women, urban residents and people with companion animals express less trust in animal welfare in prevalent farming. Valuing social equality is negatively associated with the scale, while education level is not connected with the scale. These variables account for 11.7 % of the variation in trust in prevalent animal production. A farming background, age, place of residence and valuing social equality explain the most of the variance in the variable.

#### *Behavioral Freedom*

Table 4 shows regressions for behavioral freedom. Higher scores on the scale indicate a higher valuation of the behavioral freedom of farm animals. Women and people with companion animals place greater value on the behavioral freedom of farmed animals, while those with farming backgrounds and with tertiary education place less value on it. Valuation of social equality is positively linked to the behavioral freedom scale. Age has a weak connection with the scale, while place of residence is not connected to it. The model explains 14.7 % of variance in the behavioral freedom scale. Social equality, gender, a farming background and having a companion animal explain the most of the total variance in the variable.

#### *Valuing Animal Life*

Table 4 gives results for valuation of animal life. Higher scores on the scale indicate higher valuation of the life of agricultural animals. Women and people with companion animals place greater importance on the life of animals, while people with intermediate and tertiary education and with a farming background place less value on it. The valuation of social equality is positively connected with the valuation of animal life. Age has only a weak connection with the variable. The independent variables explain 9.3 % of the variation in the valuation of animal life. Changes in  $R^2$  indicate that education level, social equality, gender and a farming background explain the most of the variance in the variable.

## Discussion

This research suggests that a farming background, valuing social equality and gender have the most coherent connection to attitudes to farm animals. These variables are connected with all the attitudinal variables examined in this study. Regression coefficients indicate a relatively strong association even when the effect of other variables has been controlled. Women, those who value social equality and those without farming backgrounds evaluate farm animal welfare more negatively, express less trust in prevailing animal production, and place more value on the behavioral freedom and life of animals.

Previous research suggests a moderate gender difference in attitudes to animal use (Herzog 2007). Our research identified a similar level of gender difference with most of the independent variables; on average women are somewhat more concerned about farm animals than men. Various reasons have been put forward for gender differences in attitudes to animals (e.g. Donovan and Adams 2007). For instance, women tend to be main family caretakers and they predominate in the care work sector (Donovan and Adams 2007; Kendall et al. 2006). The socialization of women into caring roles can generate nurturing attitudes that also extend to nonhuman animals (Kendall et al. 2006). Likewise, meat consumption is associated with masculinity, which may encourage men to perceive the utilization of animals in meat production more positively than women do (Rogers 2008; Rothgerber 2013). In order to test these hypotheses, further studies should include family-care activities, involvement in care work, nurturing attitudes and masculine values as intervening variables in their explanatory models.

Our research confirms that a farming background is associated with less concern for farm animal welfare (Boogaard et al. 2006; Kendall et al. 2006). In farm settings, animals are utilized as economic resources, and this appears to reflect in the more instrumental attitudes to farm animals (Kendall et al. 2006). Research suggests that farmers express less empathy for animals in general, compared to non-farmers (Hills 1995). Childhood farm experiences seem to have a lasting effect on attitudes to agricultural animals in adulthood too (Kendall et al. 2006).

Research indicates that attitudes to animals are connected to human-welfare, human-equality and out-group-tolerance attitudes (Deemer and Lobao 2011; Dhont et al. 2014; Paul 2000). This research gives evidence for this link as those who value social equality (in terms of gender equality, the rights of sexual minorities and general social justice) express greater concern for agricultural animals across all variables included in this study.

Regarding age, younger people evaluate the current state of farm animal welfare more negatively and express less trust in prevalent animal production than older people. However, age has a weak connection to the valuing of behavioral freedom and lives of animals. This indicates that age does not have a robust connection with different attitudinal dimensions regarding farm animals. Research often reports greater concern for farm animals among younger people, yet reasons for these differences have not been examined empirically. Age differences in animal attitudes may be related to generation-based experiences (as regards age-cohort differences,

for instance, in life conditions and socio-political situations) or lifecycle-based experiences (as regards studying, career development, parenthood, retirement and aging) (cf. Kendall et al. 2006). Our research suggests that older people tend to hold more trust in current animal farming than younger people do. However, older people do not appear to differ noticeably from younger people in the way they value the behavioral needs and lives of farm animals. In Finland, the structural change toward large intensive farms is a relatively recent phenomenon, and public debate about the status of farm animals has become animated only recently (Kaarlenkaski 2012; Kaljonen and Lonkila 2013; Lappalainen 2012; Lundbom 2009). The late politicization of farm animal issues may have influenced the views of younger people more, and consequently, younger people may be more aware of the animal welfare problems in industrial farming. Further studies could explore whether there are any age-based differences in knowledge or awareness of animal farming practices and farm animal welfare, and whether differences in knowledge have any effect on concern for farm animals in different age-groups.

As regards place of residence, people living in towns and cities evaluate farm animal welfare more negatively and express less trust in prevalent animal production than people living in rural municipalities. Yet place of residence is not connected to the valuing of behavioral freedom, and its connection to the valuation of animal life is weak. Research suggests that greater concern for farm animal welfare can be found in cities (Deemer and Lobao 2011; Boogaard et al. 2006; Kendall et al. 2006; Vanhonacker et al. 2010). While urban experience is characterized by a noticeable segregation from animal farming and slaughter, people from rural areas live in communities that are economically more reliant on animal farming (Franklin 1999; Kendall et al. 2006; Thomas 1983). Economic and social distance from animal utilization can encourage stronger moral problematization of current farming methods in urban settings (Franklin 1999; Kendall et al. 2006; Thomas 1983).

Having a companion animal has a relatively minor connection to attitudes to farm animals. This variable is mostly connected to the valuation of behavioral freedom, with companion animal keepers placing more value in it. Previous research suggests that companion animals have an important role in developing empathic attitudes toward animals (Daly and Morton 2009; Paul 2000). Our research measured only the presence of the companion animal in the household, and we did not examine other aspects of companion animal keeping, such as the species of the companion animal and the level of attachment, which can have a stronger influence on attitudes to farm animals than the mere presence of the companion animal (cf. Daly and Morton 2009). Further studies would benefit from more nuanced measures regarding keeping of a companion animal, including indicators for the species of the companion animal, the quality of interaction with the companion animal, and the level of attachment to the companion animal.

Compared to other independent variables, education level has the weakest connection to the attitudinal variables. Education level is mostly connected to the valuing of animal life; people with higher levels of education place less value on it. As we noted before, previous studies have not identified any consistent link between education level and attitudes to farm animals. Our study gives some indication that



people with higher levels of education are less concerned for farm animals, but a wider range of variables should be used in order to explore the issue in more detail.

## Conclusion

Overall, our research findings indicate that female gender, young age, urban residency, a non-farming background and social equality attitudes are linked to greater concern for farm animals. A farming background, valuing social equality, and gender have the strongest connections to farm animal attitudes, followed by age and place of residence. Our study also suggests that having a companion animal tends to have a relatively modest connection to attitudes to farm animals, with companion animal keepers expressing more concern for farm animals. Education level has the weakest connection to the attitudinal variables, with some indication that people with higher levels of education are less concerned for farm animals.

The background variables explained 9–15 % of the variation in the attitudes to farm animals. The formation of animal attitudes is a highly complex process, and the variables examined in this study covered only a portion of the numerous forces that affect these attitudes. A more thorough understanding of the link between attitudes to farm animals and companion animal keeping requires more nuanced measures for this factor. Moreover, in order to fully explore how socioeconomic status or social class background is connected to concern for farm animals, the study design should include measures for income, wealth, employment activity, occupation, economic hardship and social class identification. Likewise, a more systematic investigation of the link between attitudes to human-equality and attitudes to animals would require using more comprehensive measurements for social equality attitudes.

More research is needed in order to establish why some people come to care for farm animals while others remain relatively unconcerned for them. Alongside socio-demographic background, animal-related experiences and social equality attitudes, which we investigated in this study, political and religious affiliations also appear to play an important role in the formation of attitudes to farm animals (Deemer and Lobao 2011). A more comprehensive analysis of the relative importance of different factors in the formation of attitudes towards animals would require the inclusion of these factors in the study design.

Further research should continue to develop improved indicators for attitudes to farm animal welfare and rights. The use of well-tested and standardized indicators would improve the comparability of findings across different studies. Moreover, ethical discussion about farm animals is not limited to animal welfare alone—on the contrary, the ethical acceptability of exploiting animals for human use is constantly becoming ever more important as a moral concern (Francione 2008). Hence, there is a need to develop attitudinal measures for farm animal rights, alongside farm animal welfare. In this research we developed a measure for the valuation of animal life, but a more comprehensive analysis of attitudes to farm animal rights would benefit from a wider range of measures.

A sound understanding of social-group differences in attitudes to farm animals helps with identifying the base of supporters of initiatives that promote improvements in the status of farm animals (Deemer and Lobao 2011). As farm animal concern is linked to human equality values, those who already value societal equality are more likely to be mobilized to support farm animal causes compared to those who hold less egalitarian views (Deemer and Lobao 2011). Societal trends, such as improved opportunities for women, urbanization and reduced personal reliance on farming industry are also likely to increase the base of supporters of farm animal welfare and rights (cf. Deemer and Lobao 2011). However, further empirical testing is required to enhance understanding of the specific processes that promote greater concern for farm animals in different social groups. Improved understanding of these processes will help developing more effective policy measures for advancing farm animal welfare and rights in society.

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