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# Effects of information on social trust in farmers regarding animal welfare

**RESEARCH ARTICLE**

Sabine Gross[ⓘ] and Jutta Roosen

*Chair of Marketing and Consumer Research, TUM School of Management, Technical University of Munich, Alte Akademie 16, 85354 Freising-Weihenstephan, Germany*

## Abstract

Little consumer knowledge about agriculture and livestock production as well as mounting concerns about the consequences of modern animal husbandry are pivotal aspects of the growing gap between famers and society. Literature shows that trust can play an important role in situations characterized by limited knowledge. In this paper a salient value similarity approach to social trust is adopted where social trust is placed on people that are perceived to hold similar goals. Determinants of social trust in farmers are examined and the influence of messages about livestock production is analyzed. The study is based on data from an online survey among 1,600 German participants containing an information treatment. Results confirm literature in that positive information increases, while negative information decreases social trust. We show that salient value similarity between consumers and farmers has a high positive influence on social trust in farmers, and moderates the effects of the perceived sender of the message.

**Keywords:** salient value similarity, social trust, animal welfare, information treatment
**JEL code:** Q13, C33, D89

ⓘCorresponding author: sabine.gross@tum.de

## 1. Introduction

Within the last century, agriculture has undergone considerable changes. In Germany, as in many Western societies, a structural reformulation of the sector towards fewer and bigger farms took place (Deutscher Bauernverband, 2019). Furthermore, a mounting imbalance between consumers' expectations regarding food production on the one hand and modern agricultural production systems on the other hand can be observed (e.g. Zander *et al.*, 2013). In a recent Eurobarometer survey, 83% of German citizens demanded better protection of farm animal welfare (European Commission, 2016). In addition, Vanhonacker *et al.* (2008) found a discrepancy between general citizens' and farmers' beliefs about the current state of animal welfare; the highest difference was found in terms of the available space and stress of the animal. This was also concluded for the situation in Germany (Rovers *et al.*, 2018). Using survey data from Dutch citizens and pig farmers, Bergstra *et al.* (2017) showed that citizens are ambivalent with regard to pig husbandry. Although they evaluate some issues as acceptable, they have negative attitudes towards them. This is likely due to a lack of knowledge which is why a high number of participants felt unable to judge the acceptability of specific issues.

In focus group discussions, citizens report that direct contact to farmers is not possible for them (Rovers *et al.*, 2018). Furthermore, 13% of German respondents of an EU survey stated to have never visited a farm (European Commission, 2005). These results underline that consumers have lost familiarity with agriculture. A lack of knowledge on the agri-food sector is persistent for several reasons. First, consumers can neither accurately evaluate the sector and its practices nor can they monitor the practices themselves; additionally, the distance between farmers and consumers is growing (Meijboom *et al.*, 2006). In such situations of little or no knowledge trust comes into play (Grabner-Kräuter and Kaluscha, 2003; Siegrist and Cvetkovich, 2000). Rovers *et al.* (2018) show that trust in farmers as experts for animal husbandry is an important facet of attitude towards 'efficiency-driven' husbandry.

In fact, 71% of German citizens base their perception of agriculture on what they see in television, which – despite losing importance in recent years – is still the most important source for the citizens (Kantar Emnid, 2017). Communication in German media is mainly using the frames 'productivity' against 'naturalness' as antagonist and 'positive' against 'negative', while the occurrence of the combination of 'productivity' and 'negative' has the highest share among discussion boards and blogs (Boehm *et al.*, 2010). Citizens also perceive that media provides negative information in many cases (Rovers *et al.*, 2018). Given the missing direct exchange between consumers and farmers and the role of media, the question emerges as to how the social gap between farmers and society can be overcome. Creating a good feeling rather than communicating economic aspects and enabling emotional trust has been suggested as one solution (Bergstra *et al.*, 2015; Jokinen *et al.*, 2012).

Therefore, it is important that farmers can convey their responsible work and care for farm animals to the general public. Although the importance of trust in situations of lacking knowledge has been acknowledged, only few studies analyzed how information on actors can help to build or restore trust as shown in a review by Chryssochoidis *et al.* (2009). For example, Cvetkovich *et al.* (2002) support the asymmetry of trust, that negative messages have a higher impact than positives ones and show the importance of initial trust level for the interpretation of new information. In addition, prior beliefs seem also to have a crucial role as the effect of information could be caused by a confirmatory bias and therefore information supporting prior beliefs has a higher impact (Poortinga and Pidgeon, 2004). In this paper, we focus on the concept of social trust, which is defined as 'the willingness to rely on those who have the responsibility for making decisions and taking actions related to the management of technology, the environment, medicine, or other realms of public health and safety' (Siegrist *et al.*, 2000). Social trust has been shown to be determined by salient value similarity (SVS), a construct that describes how much an individual perceives that the person to be trusted holds values similar to their own. Using four information treatments mimicking news items we analyze determinants of social trust in famers and show how information can change it. A random effects panel regression quantifies the particular impact of the news text. The impact of information is shown to depend on perceived sender and message characteristics and is moderated by salient value similarity.

## 2. Literature review

### *2.1 Trust*

Trust is a topic in different research areas of the social and economic sciences (Rousseau *et al.*, 1998). Therefore, many definitions and concepts of trust exist (Poortinga and Pidgeon, 2003). Much of the trust literature considers the dimensions competence, objectivity, fairness, consistency and empathy (Hobbs and Goddard, 2015). These dimensions are often categorized into competence and care (Poortinga and Pidgeon, 2006). In the organizational literature trust is often distinguished into relational trust that deals with the intention of others, and calculative trust (or confidence) that reflects the ability of others (Earle, 2010). Frewer *et al.* (1996) added a third facet to this dimensional approach that reflects the accountability of the trusted party. Next to this dimensional approach, as it is called by Poortinga and Pidgeon (2006), there exist conceptualizations of trust based on the salient value similarity approach and an associationist approach, that interprets trust as a more general attitude, e.g. towards a technology.

In general, trust becomes important in risky situations (Mayer *et al.*, 1995), uncertain environments (Bhattacharya *et al.*, 1998), around complex phenomena (Luhmann, 1989) or situations characterized by a lack of knowledge (Hansen *et al.*, 2003; Grabner-Kräuter and Kaluscha, 2003; Siegrist and Cvetkovich, 2001). Also, in the case of food consumption trust becomes relevant as lack of knowledge and uncertainties arise. Many of the attributes of food products are credence attributes (Darby and Karni, 1973) and consumers have to rely on information provided by others. Frewer *et al.* (2005) propose that trust is important when consumers are uninterested in gaining more knowledge about animal husbandry. The authors show that consumers think in limited ways about animal welfare because a detailed cognitive analysis of animal husbandry practices would lead to tensions between their own consumption behavior and their knowledge about animal welfare consequences. Hence, trust in farmers and other members of the food value chain becomes a necessary given. Surveys revealed that the highest trust towards members of the value chain was associated with farmers (Frewer *et al.*, 2005). However, trust was low to medium high in general and consumers expect chain members to protect own vested interests (Frewer *et al.*, 2005). Considering demographics, Kupsala *et al.* (2015) find that women and urban residents have lower trust values, while higher values for trust in animal production were observed among older people and those with a farm background. These identified age, residence, and experience effects were attributed to a lack of knowledge that is less widespread among the older and rural population.

In the context of food consumption, the influence of trust has been examined for food safety issues (e.g. BSE), genetically modified products, and other new food technologies (e.g. food irradiation). For example, Drescher *et al.* (2012) observe in bivariate analyses that expenditures for meat vary with the level of trust of the consumer, even though they were not able to quantify the impact in a multivariate analysis. Muringai and Goddard (2011) find a significant negative influence of general trust on the probability of a reduction in beef consumption due to food safety issues. However, the concept of general trust measures how much people trust other people in general and is therefore not specific to food consumption. Nevertheless, results by Ding *et al.* (2012) indicate that a higher level of generalized trust leads to higher trust in the food system. Generalized trust can even compensate for the negative perceptions of genetically modified food (Ding *et al.*, 2012).

An important determinant of trust is salient value similarity (Earle and Cvetkovich, 1995, 1999). The salient value similarity approach introduces the concept of judgement to social trust (Lu *et al.*, 2015). Salient values describe an individual's perception of what is important in a specific situation. According to Siegrist *et al.* (2000), they are defined as mostly implicitly created generalizations. The saliency of specific values may vary and change depending on the situation, e.g. in the interaction with family members or business partners. The idea behind the model of salient value similarity is a cultural values theory of social trust, which postulates that a perceiver trusts in people and institutions that hold values similar to his own (Siegrist *et al.*, 2000). Siegrist *et al.* (2000) indicate that people trust others within a certain group (i.e. the people who

are similar to them) and distrust people and institutions outside of this group. Nakayachi and Cvetkovich (2010) show that value similarity is the strongest predictor of trust in comparison to competence and fairness. The importance of value similarity was also underlined in the discussion of emotional trust in the food system by Jokinen *et al.* (2012). Poortinga and Pidgeon (2003) find that value similarity is of importance especially for topics with little or no familiarity. However, they are not able to discern if value similarity is a distinct construct or if it can be measured with the items of general trust and skepticism. In a later study, Poortinga and Pidgeon (2006) indicate that the relationship between salient value similarity, general trust, and skepticism is more complex. They show for genetically modified food that salient value similarity with the government influences other trust-related judgements, namely general trust and skepticism. Additionally, value similarity is influenced by the government position that people perceive and their prior attitude towards genetically modified food. Meijnders *et al.* (2009) show that salient value similarity is important for trust in information by journalists about a new technology. Considering the results in the literature confirming the role of judgements for determining social trust, this paper adopts a salient value similarity approach to social trust in farmers.

### *2.2 Influence of information*

It is crucial to note that trust is a sensitive construct and easier to destroy than to build (Slovic, 1993). This asymmetric behavior of trust is at least partly caused by a confirmatory bias, meaning that prior attitudes are influencing the interpretation of new information (Poortinga and Pidgeon, 2004). In line with this observation, Cvetkovich *et al.* (2002) showed that trust perseveres, that is that information may influence trust, but that extent and direction of influence depend on previous levels of trust. Those with high trust in food chain actors react more strongly to positive news than those with low trust while those with low trust respond more strongly to negative news than those with high trust.

As Poortinga and Pidgeon (2004) show for the case of genetically modified food, negative events have a clear impact on trust. Based on a literature review, Chryssochoidis *et al.* (2009) conclude that trust in information can be influenced by the characteristics of the information such as the source, content and amount. As noted by Poortinga and Pidgeon (2006) persuasive information in a situation of distrust may lead to lower trust. This exemplifies the associationist approach where prior attitudes may contradict held beliefs and discredit information. Hence, the influence of information is moderated by the type of issue which is presented in the information. Furthermore, information sources are perceived as trustworthy to different degrees (Chryssochoidis *et al.*, 2009). In studies about the trustworthiness of information sources, governmental organizations are ranked rather low, whereas consumer organizations are ranked comparatively high (Frewer *et al.*, 1996; Pieniak *et al.*, 2007). Similarity cues can be important to make information trustworthy (Meijnders *et al.*, 2009). Also being free of vested interest and accountable plays an important role (Frewer *et al.*, 1996).

In general, negative information has a higher impact on consumers than positive information (McCluskey *et al.*, 2015). Furthermore, as shown by Hayes *et al.* (2002), negative information dominates positive messages so that willingness to pay for a product decreases if both are presented at the same time. This result also holds if the information is declared to originate from consumer advocacy groups. However, the effect depends on the prior attitude towards the topic (Poortinga and Pidgeon, 2004).

Swinnen *et al.* (2005) show that the large amount of published negative news is triggered by the preferences of consumers rather than by those of the media. Furthermore, in the work of McCluskey *et al.* (2015) negative news cause a larger decline of utility for consumers compared to the welfare increase observed in response to positive news. As a result, there is a higher demand for negative news which in turn is predicted to dominate the news market. Therefore, it is crucial to understand the effect of negative information on social trust in farmers as much as the impact of positive information.

Concluding the literature review, we derive the following hypotheses. We expect that social trust in farmers increases with salient value similarity and general trust. We furthermore anticipate that negative and positive messages have a negative and positive effect on social trust, respectively, and that the effect on social trust is stronger for negative than for positive information. We hypothesize that the impact on social trust depends on the sender that the readers perceive to be at the origin of the information and its accountability. Therefore, information by senders with vested interest may have a different impact than that by those that are perceived as impartial. We also expect it to be necessary to control for socio-demographic variables. In particular we expect social trust in farmers to be lower for women, younger respondents and those that perceive themselves as less knowledgeable about agriculture.

## 3. Data and methods

### *3.1 Data collection*

The data was collected with a German-wide online-survey in October 2016. The sample consists of 1,600 participants of an online-access panel, which were quota-sampled assuring representativeness for education, gender, age, household income and Federal State. Recruiting was done by a marketing research company.

### *3.2 Survey data*

The questionnaire contained items to measure the construct of social trust and its determinants as well as socio-demographic and socio-economic questions. In addition, the survey included an information treatment, where respondents had to read one of four news items. The constructs included in the questionnaire allow implementing the salient value similarity model according to Earle and Cvetkovich (1995). Therefore, respondents compared themselves with farmers and rated their perceived similarity – in terms of shared values, goals, behavior, thinking and opinion – on a 7-point rating scale with 1 = unlike me to 7 = like me. In addition, social trust in farmers was measured using four items on a 6-point rating scale with 1 meaning low trust and 6 meaning high trust. Both scales were adopted from Siegrist *et al.* (2000). While salient value similarity was measured only before the information treatment, the measurement of social trust was repeated before and after the information treatment.

A factor analysis confirms the variables salient value similarity and social trust as constructs of five and three items, respectively. One item was excluded from the original social trust scale for better internal consistency and due to low factor loading. The resulting Cronbach's Alpha for salient value similarity is 0.936. Social trust before the information treatment has a Cronbach's Alpha of 0.875 and after the treatment of 0.921. These values show a satisfactory level of scale reliability (Field, 2018). For factor loadings, item description, and mean values see Table 1.

### *3.3 Information treatment*

The objectives of the online experiment are: (1) to identify factors influencing consumers' social trust in farmers; and (2) to study the effect of information. Therefore, respondents were randomly assigned to one of four information treatments consisting of different news texts after the first part of the questionnaire. The news texts were developed based on examples from newspapers and websites (Supplementary Material) such that they transfer statements made by government officials or representatives of consumer organizations. The news items were also of different tonality (positive or negative). In the news messages of positive tonality, the agricultural sector was described to responsibly handle and progress on issues of animal welfare. In those of negative tonality, an unsatisfactory situation and a need for coercive regulatory action was diagnosed. The perception of positive and negative information was evaluated in a pretest with 60 respondents.

The senders of the news items were not explicitly labeled to participants in the online survey. The participants had no additional information other than the news text that they read. Neither the sender nor the tonality of

**Table 1.** Factor analysis with variable descriptions.

| Variable | Description | Factor loading[1] | Mean | Std. deviation |
|---|---|---|---|---|
| Salient value similarity (SVS) | Salient value similarity from 1 = unlike me to 7 = like me; calculated as mean of variables SVS 1, SVS 2, SVS 3, SVS 4, SVS 5 | | 3.853 | 1.426 |
| SVS 1 | A farmer has different/the same values than/as me. | 0.823 | 4.138 | 1.592 |
| SVS 2 | A farmer has different/the same goals than/as me. | 0.886 | 3.718 | 1.682 |
| SVS 3 | A farmer acts differently/the same than/as I would. | 0.907 | 3.853 | 1.542 |
| SVS 4 | A farmer thinks unlike/like me. | 0.926 | 3.751 | 1.601 |
| SVS 5 | A farmer has different/the same opinions than/as me. | 0.923 | 3.802 | 1.567 |
| Social trust (ST) | Social trust from 1 = completely disagree to 6 = fully agree; calculated as mean of variables ST 1, ST 2, ST 3 | | | |
| | Before the information treatment | | 3.518 | 1.144 |
| | After the information treatment | | 3.499 | 1.158 |
| ST 1 | Farmers are interested in producing products with high animal welfare standards. | | | |
| | Before the information treatment | 0.873 | 3.490 | 1.276 |
| | After the information treatment | 0.920 | 3.529 | 1.263 |
| ST 2 | On the whole, the treatment of animals in agriculture is responsible. | | | |
| | Before the information treatment | 0.916 | 3.533 | 1.344 |
| | After the information treatment | 0.940 | 3.498 | 1.261 |
| ST 3 | Farmers take good care of their animals' welfare. | | | |
| | Before the information treatment | 0.896 | 3.533 | 1.212 |
| | After the information treatment | 0.929 | 3.471 | 1.212 |

[1] Factor loadings are defined as the coefficient of a linear regression explaining the factor by the specific items of the factor (Field, 2018).

the message was made explicit (except for the information in the text itself). However, in three of the four news clips, the protagonist giving a statement was mentioned: A – government, B – minister of agriculture, C – chairman of the Federation of German Consumer Associations. In D, 'we' (non-specified) was demanding legal initiatives in the protection of animal welfare.

After the information treatment respondents were asked to rate the text that they had just read in terms of reliability, novelty, informativeness and tonality. They were then prompted to indicate whom they (subjectively) perceived as sender of the information. For the timing of variable measurement and treatment see Figure 1.

### *3.4 Model specification*

The objective of the analysis is to evaluate determinants of social trust in farmers, as well as the influence of salient value similarity and message characteristics on participants' social trust in farmers regarding animal welfare. We first conduct paired *t*-tests to examine whether the news texts have a significant impact on social trust. Then we estimated two random-effects panel regression models based on Equation 1 and 2 to investigate determinants of social trust in farmers and the influence of news texts. The first model measures the effects of the four different news texts using a dummy variable approach, while the second model yields a deeper understanding of the effects of news texts on social trust in farmers by including message characteristics as explaining variables.

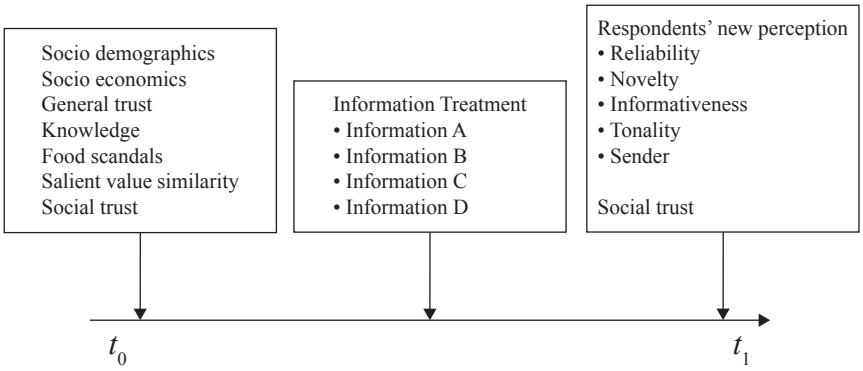


**Figure 1.** Procedure and content of survey and information.

In the following equations, subscript *i* refers to the individual respondent and *t* to time, with $t = 0$ indicating measurement of time varying variables before the information treatment and $t = 1$ after reading the news text. *SVS* stands for salient value similarity.

Variable descriptions are found in Table 2. In Equation 1, dummy variables are used to distinguish the effect of the four news texts. The set of variables 'News Texts' refers to the respective dummy variables (Information A, Information B, Information C, Information D). As $t = 0$ indicates the status before the information treatment, all variables for news texts are set to zero for that period.

$$\begin{aligned} Social\ Trust_{it} = {} & \beta_0 + \beta_1 Female_i + \beta_2 Age_i + \beta_3 Education_i + \beta_4 Food\ Scandal_i \\ & + \beta_5 Vegetarian_i + \beta_6 Knowledge_i + \beta_7 Household\ Size_i \\ & + \beta_8 Household\ Income_i + \beta_9 General\ Trust_i \\ & + \beta_{10} SVS_i + \sum_{k=1}^{4} \delta_k\ News\ Texts_{kit} + u_{it} \end{aligned} \quad (1)$$

Equation 2 uses perceived message characteristics (reliability, tonality, informativeness, and novelty) as determinants of social trust in farmers replacing the message dummies that were used in Equation 1. The set of variables 'perceived sender' refers to the perceived sender of the message, which could be farmers, government, animal rights organization, consumer association, media, or research. As in Equation 1 perceived message characteristics, including the perceived sender, were set to zero at $t = 0$.

As mentioned before, literature indicates a strong impact of salient value similarity on social trust and that salient value similarity gains importance in situations of low familiarity. Therefore, we hypothesize that salient value similarity moderates the effect of the news texts on social trust and include besides the perceived message characteristics and perceived sender the interaction term of both variables with salient value similarity (SVS).

$$\begin{aligned} Social\ Trust_{it} = {} & \beta_0 + \beta_1 Female_i + \beta_2 Age_i + \beta_3 Education_i + \beta_4 Food\ Scandal_i \\ & + \beta_5 Vegetarian_i + \beta_6 Knowledge_i + \beta_7 Household\ Size_i \\ & + \beta_8 Household\ Income_i + \beta_9 General\ Trust_i + \beta_{10} SVS_i + \beta_{11} Reliability_{it} \\ & + \beta_{12} Reliability_{it} \times SVS_i + \beta_{13} Tonality_{it} + \beta_{14} Tonality_{it} \times SVS_i \\ & + \beta_{15} Informativeness_{it} + \beta_{16} Informativeness_{it} \times SVS_i + \beta_{17} Novelty_{it} \\ & + \beta_{18} Novelty_{it} \times SVS_i + \sum_{j=1}^{6} \vartheta_j\ Perceived\ Sender_{jit} \\ & + \sum_{j=1}^{6} \mu_j\ Perceived\ Sender_{jit} \times SVS_i + u_{it} \end{aligned} \quad (2)$$

The presentation of the analysis and results proceeds as follows. First, descriptive statistics are calculated for the sample as a whole. Second, the rating of messages and its impact on social trust in farmers are described. Third, the random-effects panel regressions (1) and (2) analyze the determinants of social trust in farmers regarding animal welfare and the impact of news messages.

## 4. Analysis and results

### *4.1 Descriptive results*

Descriptive statistics on the sociodemographic characteristics of the sample as well as comparison with the German population if available are provided in Table 2. The sample contains an almost equal share of men and women and is therefore representative. On average, the respondents have an age of 49 years, are slightly older than the German population and live in households of 2.23 people. 43% of the participants have a monthly net-household income between 2,000 and 4,500 Euros and 32% of the participants have an education of at least (specialized) grammar school. Compared to the German population, the sample is somewhat overrepresenting mid-income classes. In terms of education, the sample is slightly more educated than the population. Participants show a rather low level of general trust (5.667) that compares to the one of 6.284 that was found in the European Social Survey (European Social Survey, 2016). The share of vegetarians and vegans in the sample is 8.8% and the self-reported knowledge of farm animal husbandry practices is medium (3.041). About a quarter of the participants recalled a food scandal to have happened within the 6 months prior to the survey. The sample was representative for Germany in terms of residency by federal state.

### *4.2 Information treatment*

The participants were confronted with a randomly assigned news text (Supplementary Material) and rated the presented information in terms of reliability, novelty, informativeness, and tonality on a 7-point rating scale. Table 3 shows mean values and standard deviations. The participants perceive the messages as somewhat reliable (4.499) but are unsure about their novelty (4.109). Furthermore, they rate the messages as slightly informative (4.712).

As previously described, the news texts were conceived from existing media to present positive and negative information transferring messages from either a government or consumer association. Table 4 reports the results from the main survey regarding the perception of messages per news text. Perceived tonality was measured from positive (1) to negative (7).

Information D rated highest in terms of perceived reliability, whereas Information C has the lowest ratings. Perceived novelty is ranked around the midpoint for all four news texts. Information D is ranked as most informative, while Information C is ranked as least informative. Participants evaluate Information A and B as somewhat positive, while Information C is perceived as more neutral, and D as slightly negative.

The perceived sender was difficult to discern for respondents. We indicate the percentage in bold where our and the respondents' message attribution coincide. It was easier for participants to indicate the correct sender for the messages by the government than those by the consumer association. However, summing attribution to a consumer association or animal rights organization leads to a share of 38.0% and 68.6% for Information C and D, respectively.

Table 5 shows the average measures of social trust in farmers before and after the information treatment. Results before and after are compared in a *t*-test. There were no significant differences in social trust between the groups before the information treatment ($F(31,596)=1.85$, $P=0.14$). In line with expectations, the most positive ranked information (A) increases social trust, whereas the most negative ranked information (D) decreases social trust. Those two messages yield the highest changes in social trust and only these changes are significant. The effect of Information D is larger than that of Information A ($t=8.85$, $P<0.001$).

**Table 2.** Variable definitions and summary statistics.

| Variable | Definition | | Mean | Std. deviation | German population[1] |
|---|---|---|---|---|---|
| Female | 1 = female, 0 = male | | 0.506 | | 50.7% |
| Age | | | 48.658 | 15.610 | 44.3 |
| Education | Measured in 6 categories | | | | |
| | No degree/Not yet a degree | 1.6% | | | 4.0% |
| | Secondary general school | 31.7% | | | 31.4% |
| | Polytechnic secondary school | 7.3% | | | 6.7% |
| | Intermediate secondary school | 27.3% | | | 22.7% |
| | (specialized) Grammar school | 15.2% | | | 30.8%[2] |
| | University (of applied sciences) | 16.9% | | | |
| Household size | Persons in the household | | 2.230 | 1.097 | 2.01 |
| Household income (Euro) | Measured as net-household income per month | | | | |
| | <500 | 2.1% | | | 1.6% |
| | 500-899 | 7.1% | | | 8.2% |
| | 900-1,299 | 13.0% | | | 11.8% |
| | 1,300-1,499 | 8.9% | | | 6.6% |
| | 1,500-1,699 | 7.2% | | | 6.5% |
| | 1,700-1,999 | 9.6% | | | 8.8% |
| | 2,000-2,599 | 16.4% | | | 15.1% |
| | 2,600-3,199 | 12.3% | | | 11.0% |
| | 3,200-4,499 | 14.8% | | | 15.1% |
| | 4,500-5,999 | 6.1% | | | 12.4% |
| | >6,000 | 2.5% | | | |
| General trust | In general: do you think most people can be trusted, or do you think one can't be careful enough when dealing with other people? Measured from you can't be careful enough (1) to you can trust most people (11) | | 5.667 | 2.440 | |
| Vegetarian | 1 = vegetarian or vegan; 0 = non-vegetarian diet | | 0.088 | | |
| Knowledge | How would you describe your level of knowledge regarding animal husbandry systems? Measured from very low (1) to very high (5) | | 3.041 | 0.775 | |
| Food scandal | Have you seen, heard, or read any new reports in the media over the past six months about a current food scandal? 1 = yes; 0 = no | | 0.284 | | |

[1] If available, own calculations (Statistisches Bundesamt, 2017a,b, 2019).

[2] Persons holding at least the degree of a (specialized) grammar school, which is also true for persons in our sample owning a degree of a university (of applied sciences). Hence the sample contains 32.1% of respondents with at least (specialized) Grammar School. In Germany, 23.3% of the population hold a degree of a university (of applied sciences) (Statistisches Bundesamt, 2017b).

**Table 3.** Descriptive statistics on information treatments.

| Variable | Description | Mean | Std. deviation |
|---|---|---|---|
| Perceived reliability | What is your assessment of the content of the news item you just read? Not credible (1) to very credible (7) | 4.499 | 1.529 |
| Perceived novelty | What is your assessment of the content of the news item you just read? No novelty (1) to high novelty content (7) | 4.109 | 1.525 |
| Perceived informativeness | What is your assessment of the content of the news item you just read? Not informative (1) to very informative (7) | 4.712 | 1.526 |

**Table 4.** Participants' rating of news texts.[1]

| | Information | | | |
|---|---|---|---|---|
| | **A** | **B** | **C** | **D** |
| Perceived reliability | 4.311 (0.053) | 4.461 (0.050) | 3.995 (0.053) | 5.275 (0.049) |
| Perceived novelty | 4.427 (0.049) | 4.084 (0.054) | 3.813 (0.054) | 4.115 (0.056) |
| Perceived informativeness | 4.788 (0.050) | 4.690 (0.052) | 4.103 (0.054) | 5.304 (0.051) |
| Perceived tonality | 2.649 (0.069) | 2.901 (0.069) | 3.400 (0.067) | 3.950 (0.090) |
| Recognized sender | | | | |
| Farmers | 7.4% | 3.7% | 17.7% | 6.0% |
| Government | **49.4%** | **60.8%** | 28.3% | 4.5% |
| Animal rights organization | 9.6% | 12.1% | 9.3% | 56.3% |
| Consumer association | 10.9% | 7.1% | **28.7%** | **12.3%** |
| Media | 17.0% | 13.3% | 12.8% | 14.1% |
| Research | 5.7% | 3.0% | 3.2% | 6.8% |
| Participants | 405 | 406 | 407 | 382 |

[1] Standard error in parentheses The numbers in bold indicate the share of participants that recognized the true sender of the information.

**Table 5.** Impact of news texts on social trust values.[1]

| | Social trust | | |
|---|---|---|---|
| **Information** | **Before** | **After** | **Difference** |
| A | 3.421 | 3.632 | 0.211*** |
| B | 3.604 | 3.565 | -0.039 |
| C | 3.546 | 3.597 | 0.051 |
| D | 3.500 | 3.184 | -0.316*** |

[1] * $P<0.1$, ** $P<0.05$, *** $P<0.01$.

*4.3 Regression results*

Results of the parameter estimates for the random-effect panel estimation are given in Table 6.

General trust significantly and positively affects social trust in farmers. The parameters are 0.069 and 0.063 in Model 1 and Model 2, respectively. Salient value similarity with farmers is a significant and strong predictor of social trust with coefficients of 0.321 and 0.351.

Model 1 reports the effects of the four messages. Information A has a significant positive impact on social trust in farmers. The reverse holds true for Information D. The other two messages do not lead to significant changes in trust confirming the results from the *t*-test above.

Next, the dummy variables for the four messages were replaced by the perceived message perception in Model 2. The only perceived message characteristics, which by itself significantly change the social trust in farmers are reliability and novelty. If respondents perceive a message as more reliable or novel, their social trust in farmers increases by 0.144 or 0.082 after receiving a message, respectively. In addition, the interaction with salient value similarity is also significant for reliability. When respondents perceive a message as reliable trust increases, but the effect depends on how similar respondents see themselves with farmers. The overall effect of perceived reliability becomes negative for high values of SVS ($0.144 - 0.028 \times SVS$). In the case of perceived tonality, the effect itself is not significant, but the interaction with salient value similarity is significant and negative. Most of the perceived senders and their interaction with salient value similarity are significant. For example, when respondents perceive the sender of a message as farmers, social trust in farmers decreases; however, this effect is softened by salient value similarity. The effect of

**Table 6.** Regression results.[1]

| | Model 1 | | Model 2 | |
|---|---|---|---|---|
| | **Estimate** | **SE** | **Estimate** | **SE** |
| Trust indicators | | | | |
| General trust | 0.069*** | 0.010 | 0.063*** | 0.010 |
| Salient value similarity | 0.321*** | 0.017 | 0.351*** | 0.018 |
| Message | | | | |
| Information A | 0.190*** | 0.037 | | |
| Information B | -0.027 | 0.037 | | |
| Information C | 0.055 | 0.037 | | |
| Information D | -0.311*** | 0.038 | | |
| Perceived message characteristics | | | | |
| Reliability | | | 0.144*** | 0.051 |
| Reliability × SVS | | | -0.028** | 0.013 |
| Novelty | | | 0.082** | 0.040 |
| Novelty × SVS | | | -0.004 | 0.010 |
| Informativeness | | | -0.025 | 0.054 |
| Informativeness × SVS | | | -0.003 | 0.014 |
| Tonality | | | 0.045 | 0.034 |
| Tonality × SVS | | | -0.033*** | 0.009 |
| Perceived sender | | | | |
| Farmer | | | -0.718** | 0.288 |
| Farmer × SVS | | | 0.204*** | 0.074 |
| Government | | | -0.663*** | 0.237 |
| Government × SVS | | | 0.194*** | 0.062 |
| Animal rights organization | | | -1.294*** | 0.300 |
| Animal rights organization × SVS | | | 0.288*** | 0.076 |
| Consumer association | | | -0.552** | 0.281 |
| Consumer association × SVS | | | 0.176** | 0.071 |
| Media | | | -0.196 | 0.276 |
| Media × SVS | | | 0.042 | 0.071 |
| Research | | | -0.671* | 0.354 |
| Research × SVS | | | 0.165* | 0.085 |
| Socio demographics | | | | |
| Female | -0.091** | 0.046 | -0.088** | 0.044 |
| Age | 0.007*** | 0.002 | 0.006*** | 0.001 |
| Education | -0.058*** | 0.016 | -0.055*** | 0.016 |
| Scandal | -0.158*** | 0.051 | -0.150*** | 0.049 |
| Vegetarian | -0.419*** | 0.082 | -0.386*** | 0.079 |
| Knowledge | 0.059* | 0.030 | 0.052* | 0.029 |
| Household size | 0.026 | 0.024 | 0.019 | 0.023 |
| Household income | -0.013 | 0.020 | -0.011 | 0.019 |
| Constant | 1.695*** | 0.154 | 1.658*** | 0.151 |
| $R^2$ | 0.264 | | 0.298 | |

[1] * $P<0.1$, ** $P<0.05$, *** = $P<0.01$. SE = standard error; SVS = salient value similarity.

farmers as perceived sender is then -0.718 + 0.204 × SVS. A higher coefficient is only observed for animal rights organizations being perceived as sender, i.e. -1.294 + 0.288 × SVS. The perceived senders government, research, and consumer association also have significant and large coefficients. In these cases, the effect of the perceived sender by itself is negative, but the interaction term turns it positive for participants' showing high salient value similarity with farmers.

In addition to general trust and perceived salient value similarity, the models include information on respondents' socio-demographic characteristics. Coefficient sizes are fairly stable across the two models. There is a small, but significant effect of gender on social trust in farmers in which women's trust is lower. Social trust also increases with age and education. The highest impact among the socio-demographic variables is observed for the recall of a food scandal (-0.158 and -0.150) and being vegetarian (-0.419 and -0.386). Both variables are significant in both models. Knowledge of farm husbandry practices is positively associated with social trust in farmers. Household size and income were not found to be statistically significant.

For a more detailed interpretation Model 2 is run for each information treatment individually (Supplementary Table S1). Thereby, we try to identify heterogeneous message effects. Variation in message ratings (see Table 4) suggest an investigation of heterogeneous effects. Running single regressions increases for each regression the model fit. Nevertheless, the results go in the same direction as the results of Model 2 with partly stronger coefficients for single news texts.

## 5. Discussion

The aim of this paper was to investigate determinants of social trust in farmers regarding animal welfare as well as the effect of information. Additionally, other impacting and moderating factors were examined. Our study shows that information has an effect on social trust, while the most negative message decreases trust, corroborating results from the existing literature. Comparable to the effect on consumer utility (McCluskey *et al.*, 2015), our results confirm that a negatively perceived message has a larger effect than a positive perceived message. Among messages with significant impact on social trust, Information D (which is perceived as the most negative and assumed to originate from an animal rights organization) generates the highest absolute change in social trust and is perceived as the most reliable. In accordance with the literature, the most reliable message in our experiment is the one that was perceived as the most negative (Slovic, 1993). In comparison, Information A (which is perceived as the most positive and assumed to originate from the government) leads to a smaller change in trust and is perceived as less reliable. The perceived reliability of the messages is in line with the rating of the trustworthiness of information sources by other authors (Frewer *et al.*, 1996; Pieniak *et al.*, 2007) showing low values for the messages perceived to originate from government. The relationship between the trustworthiness of a sender and the reliability of a message can be caused by the halo effect, which means that '(…) individuals judge objects, people or things in terms of general attitudes towards them' (Alhakami and Slovic, 1994). Hence, participants project their perception of a sender onto the evaluation of a message. Therefore, perceived reliability of a message in our experiment exhibits a similar pattern as trust in information reported in previous research.

While Information A and D yield significant changes in social trust, Information B and C were unable to do so. One reason could be the content of the news text and especially the vagueness in Information B and C. These two messages can be understood as statements of intent, in which representatives of the two senders, the minister of agriculture or the chairman of the Federation of German Consumer Associations, talk about what should be achieved in the near future. In contrast, Information A and D make clear statements about achievements (percentage of cage rearing in Germany in comparison to other countries (Information A)) and demands (publicly available inspection reports (Information D)). In addition, unusual combination of perceived sender and tonality could be an explanation for the non-significant effects by Information B and C. That means, a negatively perceived message assuming to be from government (Information B), yields insignificant changes in social trust, possibly because it is not congruent with the expectations of respondents. According to Kantar Emnid (2017), expectations regarding German agriculture are mainly based on the information given on television. Participants of focus group discussions in Germany perceive media to communicate mostly in a negative manner about livestock production (Rovers *et al.*, 2018), which is supported by internet data at least for the frame 'productivity' (Boehm *et al.*, 2010). Potentially the general media shows consumer associations (as well as animal rights organizations and other NGOs) mostly as critics of the current agricultural system, while the government and farmers and their associations are mostly seen in a defensive role. Therefore, respondents could be confused by a message assuming to originate from

animal rights organization or consumer association with only slightly negative tonality, as well as a neutral to slightly positive message probably originating from the government. Supporting this, respondents were unable to discern whether the government or a consumer association is the sender of Information C, although the chairman of a consumer association was staged as protagonist. Furthermore, Information C was ranked as the least reliable message. In an attempt to use realistic messages in the information treatment, we also did not take the same messages with different senders in the treatments. Therefore, it must be acknowledged that the messages are with varying tonality even if the same direction was intended, which is a limitation of our study.

In the panel regressions, a sizable difference in social trust can be attributed to high involvement with food and animal-based products such as expressed by being vegetarian or recalling a food scandal. Siegrist (2001) indicates that concernment has an influence on trust. Hence, it may be that concern for animal welfare is higher for vegetarians than for people following an omnivore diet. Indeed research shows that vegetarians often claim to be motivated in their refusal to eat meat by their concern regarding animal welfare (Beardsworth and Keil, 1991).

Additionally, results show a significant although weak impact of socio-demographic variables such as age and gender on social trust. Similar to Kupsala *et al.* (2015) women have lower trust and older people higher trust. Kupsala *et al.* (2015) hypothesize the impact of gender to be caused by a generally higher level of concernment by women and their role in society. This sounds reasonable, as women are most often responsible for the food purchasing in the household and therefore are more often in the situation where social trust in farmers is important. Furthermore, in our sample more women than men are vegetarians and remember a food scandal. This indicates that women are in general more concerned, which may explain lower social trust in farmers. In addition, McKendree *et al.* (2014) find women as well as younger people to be more concerned about animal welfare in an U.S. sample. Our results support the observation and show a positive and significant influence of age on social trust. Potentially, age could be a crude indicator of farm background, similar to Kupsala *et al.* (2015) who found higher levels of trust in current animal husbandry among people with a farm background. In Germany in the 1950s, many more people were working in the agricultural sector compared to now and therefore, also the children of this generation had more contact to agriculture and farmers.

Our results show significant influences of certain message characteristics, namely reliability and perceived sender. Information which is perceived to be reliable has an increasing effect on social trust. Interestingly, it was not possible to show an effect for tonality, although previous literature had shown an influence (e.g. Poortinga and Pidgeon, 2004). It is possible, that further underlying factors influence the effect of tonality on social trust, as for example prior trust level (Cvetkovich *et al.*, 2002) or systematic differences in the information (White and Eiser, 2006). Regarding perceived senders, we see a clear impact on social trust. The highest change in social trust is generated by animal rights organization as perceived sender. Interestingly, almost all perceived senders have a significant negative influence on social trust in farmers. A pattern which senders have higher and lower impact is not visible, as the effect of government as a sender with potentially vested interests (Frewer *et al.*, 1996) is close to the ones of research and consumer association, who were ranked as more trustworthy in the work by Frewer *et al.* (1996).

We are able to confirm the impact of general trust and salient value similarity on social trust. Supporting literature, general trust increases social trust, although it has only a weak influence. In our case salient value similarity has a high impact on social trust in both models. Moreover, in the second model, in which the concept acts as a moderator, it softens the negative effect of the perceived sender. Interaction with salient value similarity yields significant results for most senders and turns the effect positive for respondents with high salient value similarity. Interestingly, the interaction with salient value similarity leads to a decrease of social trust for information that is perceived to be more reliable. One possible explanation could be that the negatively perceived messages and especially Information D are perceived as more reliable than the positive ones. This perceived reliability of an information source is somewhat comparable to the trustworthiness

of information sources that has been used in other studies (Frewer *et al.*, 1996; Pieniak *et al.*, 2007). In addition, McKendree *et al.* (2014) find that information regarding animal welfare provided by industry groups or subject matter experts are barely used by the respondents and assume this is the results, because these resources show too little concern for the topic.

Following the classification of agriculture as topic with less familiarity (Meijboom *et al.*, 2006), especially animal husbandry as a field of little knowledge (Frewer *et al.*, 2005), and our sample reporting to have rather medium knowledge about animal husbandry systems, the high influence of value similarity that is found in this paper is not surprising. Poortinga and Pidgeon (2003) also examined the importance of value similarity in situations with low familiarity. Therefore, our results confirm that salient value similarity as a base for trust judgement is relevant in such situations.

## 6. Conclusions

As most consumers are rather unfamiliar with agriculture in general and animal husbandry in particular, trust is of increasing importance. Our study confirms the principle of trust asymmetry in the case of social trust in farmers. Information perceived as negative has a larger impact compared to information perceived as positive. In addition, we contribute to the literature in demonstrating the important role of salient value similarity for social trust in farmers, which also moderates perceived message characteristics. Further research should examine the influence of beliefs, values, and other factors besides socio-demographics. Such an approach is supported by Vanhonacker and Verbeke (2014) who conclude based on the literature that personality traits (including values) are more important for the evaluation of animal welfare than socio-demographic variables alone.

Our results yield important implications for stakeholders in the agricultural sector who aim to improve the social trust in farmers. Communication should underline similarities between consumers and farmers, helping to change the perceived picture of farmers in order to rebuild social trust. However, to influence the image of farmers, more information and understanding is needed on both sides. In addition, the presentation of farmers in the public should be such that consumers can recognize that values similar to their own guide farmers' animal husbandry practices. Furthermore, there is a need for farmers to know the values and goals of consumers. This knowledge would allow farmers to better act in accordance with the underlying motivations of consumers.

Due to the overall higher impact observed for negative compared to positive messages, it is also important to reduce negative information about farmers. However, analyses of the political economy driving media show that a higher amount of negative news is likely to prevail (McCluskey *et al.*, 2015; Swinnen *et al.*, 2005). Participants in our information treatment perceived the tonality of the different messages coming from the same sender as fairly similar, not distinguishing the negative and positive tonality. Interestingly, perceived reliability has a significant impact on social trust and can counteract the negative tonality of a message. It has, however, the strongest impact for participants with low salient value similarity. The challenge remains to build communication strategies with positive albeit reliable messages.

This paper responds to the call for more experimental research on trust (Poortinga and Pidgeon, 2006). Future research could further investigate the ability to create trustworthiness with the help of different information sources to counter the negativity bias. Our results suggest that this is hard to do as an information from a consumer association with the intention to be positive (C) has the lowest reliability scores and was not able to create significant social trust changes. In addition, future research could use messages bearing the same information and label them as originating from different senders to further elaborate the influence of the perceived sender on message characteristics and social trust.

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## Supplementary material

Supplementary material can be found online at https://doi.org/10.22434/IFAMR2020.0034

**Information** A, B, C, D.
**Table S1.** Panel regression results separated by information treatment (Model 2).

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