



Comparison of media frames and audience attitude factors regarding farm animal husbandry

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Abstract

The practices employed in the husbandry of farm animals are a matter of public debate in Western societies. The media is held responsible by representatives of the industry for fostering critical attitudes toward intensive livestock farming. This prompts the question of the extent to which media frames are associated with the attitudes of the media audience. To investigate this association, a comprehensive online survey was conducted in Germany (n = 1,800) on the attitudes of media audience towards livestock farming. A battery of Likert-scale attitude items, derived from a previously published media frame analysis, was subjected to a principal component analysis (PCA) to infer respective media audience attitude factors. The identified factors were then qualitatively analysed for their association with the media frames found in the aforementioned media frame study. The results show that while there are similarities between media audience attitude factors and media frames, these associations are fuzzy. In contrast to the nine media frames identified in the previous media content analysis, the PCA yielded eight media audience attitude factors. Four media audience attitude factors are rather closely associated with four corresponding media frames. Three media audience attitude factors are associated with three or more different media frames, with only some overlap. The ‘down-playing’ media audience factor shows no association with any media frame. The media audience’s attitudes towards animal husbandry are not clearly associated with the preceding media frames. This suggests that the media audience interprets information provided by the media in slightly different ways. A more nuanced approach to explaining media audiences’ attitudes towards farm animal husbandry practices may therefore be warranted.

Keywords

principal component analysis – livestock farming – media audience’ attitudes – media frames

1 Introduction

The practice of intensive livestock farming in Western societies is facing an increasing level of scientific (Sundrum 2024) and public criticism (Hårstad, 2023). Public discourse (McHenry et al. 1996; Artner-Nehls et al., 2023), farm sector surveys (Schmitz et al., 2024) and farm press media analysis (Artner-Nehls et al., 2022) suggest that stakeholders within the livestock

sector attribute much of the mounting criticism to the media’s portrayal of animal husbandry practices (Buddle et al., 2019; Kothe et al., 2020). This is generally attributed to the use of sensational headlines, emotionally charged language, and provocative images, which are believed to boost readership (Molek-Kozakowska, 2013). Consequently, there is a perception of media bias against the livestock industry (Rice et al., 2020). This portrayal is associated with an increase in public

scepticism and criticism of animal husbandry practices (Erler et al., 2021; Christoph-Schulz et al., 2018; Spiller et al., 2016; von Meyer-Höfer et al., 2024).

The socio-political function of media as a watchdog is to identify and draw attention to instances of misconduct and wrongdoing in all areas of society (Garnham, 2020). In today's media-driven society, media play a pivotal role in shaping media audience' awareness, prioritisation and the urgency of issues (Bondadelli and Friemel, 2017). As the gap between media audience and agricultural practices widens, media reports become crucial sources of information, particularly for socially problematic issues where the code-of-conduct and journalistic-norm oriented media's influence and responsibility are pronounced (Bondadelli and Friemel, 2017). Empirical studies have demonstrated that the media has a differentiated impact on audience attitudes towards farm animal husbandry (Tonsor et al., 2011; Rice et al., 2020). Reports that highlight suboptimal conditions for farm animals tend to evoke concern or rejection among the majority of media audiences (Boehm et al., 2010; Thompson et al., 2011; Spiller et al., 2012). Thereby, the implications of media influence are multifaceted. They encompass not only the immediate media audience sentiment and consumer behavior but also the broader regulatory and market dynamics that respond to societal pressures (cf. McCluskey et al., 2016). While earlier studies concentrated on the general media audience's opinion of agriculture (Boehm et al., 2010; Spiller et al., 2012), recent publications have also addressed new technologies and digitalisation (Marks et al., 2007; McCluskey et al., 2016; Mohr and Höhler, 2023). The manner in which livestock farming is portrayed in the media can influence how farmers perceive and respond to the information they encounter. The combination of this portrayal and societal pressures can result in anxiety and affect farmers' mental health, alter their human-animal relationship, which may in turn diminish their motivation and indirectly impact animal welfare through possible animal neglect (Duley et al., 2022). Thus, understanding the nexus between media portrayal and audience perception is crucial for stakeholders aiming to navigate and address the evolving landscape of intensive animal husbandry. So, despite a diverse coverage, the role of the media in shaping media audience attitudes and perceptions (Kantar Emnid, 2017), acceptance of farm animal husbandry is not clearly understood (Christoph-Schulz et al., 2018; Jarren and Wessler, 2002). It is not clear how media audience' attitude patterns of animal husbandry are associated to media reporting in general and media frames in particular.

Therefore, the aim of this paper is to investigate the association between certain patterns of interpretation of the media (media frames) and the patterns of interpretation prevailing in the media audience – so-called media audience attitude factors. Media audience are the persons who receive a message, i.e. the reader, listener, viewer or visitor. In this study this refers to the reader of written media (print media or digital), with the focus on daily newspapers and magazines. For this purpose, we analyze attitude patterns of media audience by means of a principal component analysis (PCA) (factor) and compare it with the media frames identified by Wolfram et al. (2021). In this way, the extent to which media reporting is associated with audience attitude patterns towards farm animal husbandry will be examined. Specifically, we aim to answer the following research questions:

1. Which media audience attitude patterns (factors) can be derived?
2. Is there an association between media audience attitude factors and media frames?

We derive two main hypotheses from these research questions:

1. There are distinct factors summarizing media audience attitudes towards animal husbandry
2. There is a clear association between media audience factors and media frames about animal husbandry

2 Background

Media framing refers to how issues are presented to the media audience through the lens of the media, potentially shaping audience attitudes and influencing audience understanding. Media frames reduce complex societal debates. Within these patterns of interpretation, certain positions of actors are brought to the fore while others are de-prioritized (Matthes, 2007; Wolfram et al., 2021). Media coverage of animal husbandry is characterised by a multitude of different actors in different thematic fields (Wolfram et al., 2021). The range of topics is broad, from farm animal husbandry as a cause of environmental problems, political and social responsibility, food product innovations to demands for higher animal welfare standards and better husbandry conditions (Kayser et al., 2011; Brümmer, 2015; Wolfram, 2021). Reports on animal welfare in agriculture appear almost daily but in changing intensity and frequency over the course of time – also the relative importance of certain media frames can change over time (Wolfram

et al., 2021). For example, Wolfram et al. (2021) show for their reference period that their media frame ‘animal welfare’ increased from 2010 to 2015 as animal welfare might have become more important to the general public in Germany during this time period.

Research on media framing and its effects on media audience attitude patterns reveals a complex and multifaceted relationship. Media frames, which are the ways in which information and events are presented and structured by the media, can potentially influence media audience cognitions, emotions, and opinions (Kepplinger et al., 2012). However, this influence is not straightforward; it is mediated by individual attitude patterns, which are the pre-existing cognitive schemas and interpretive frameworks that individuals bring to their media consumption (Kepplinger et al., 2012; van Drunen et al., 2012). Media frames can shape media audience attitude patterns by providing cues that help individuals organize and interpret information. This process often results in media audience attitude patterns that complement the fragmentary nature of media frames, thereby generating consistent impressions and interpretations based on these media cues (Kepplinger et al., 2012). For instance, when media coverage of an issue is framed in a particular way, it can guide media audience to perceive and understand the issue through a similar lens, reinforcing certain aspects while downplaying others. For instance, the impact of media frames on online information-seeking behavior has been observed, with evidence suggesting that the way information is framed can influence the types of information media audiences seek out (Kessler and Guenther, 2017). Different types of media frames can lead to varying effects on how media audiences pursue additional information online, indicating that framing can steer not only immediate perceptions but also subsequent behaviors related to information gathering.

Methodologically, the analysis of media and media audience attitude patterns employs various approaches to uncover the intricacies of framing effects. Comparative frame analysis, highlighted by Hameleers and Vliegenthart (2016), involves comparing how different frames are presented across various media sources and contexts to identify patterns and variations in framing. Framing effects have been studied in a wide range of contexts, including political conflicts. Research by Thiel and Kempf (2014) and De Landtsheer et al. (2002) illustrates how media frames can influence public opinion and attitudes towards political events and conflicts, shaping perceptions of actors, actions, and outcomes. Despite these insights, challenges in framing research persist.

3 Data and methods

3.1 General empirical concept

Our analysis in this paper was mainly motivated to verify if the media frames identified by Wolfram et al. (2021) are reflected in media audience attitude factors about animal husbandry practices. Results of Wolfram et al. (2021) and Alföldi et al. (2007) show that the print media portray farm animal husbandry in a multifaceted, nuanced and complex way. Media audience are the persons who receive a message, i.e. the reader, listener, viewer or visitor. In this study the reader of written media (print media or digital), with the focus on daily newspapers and magazines. For the purposes of this study, a media audience attitude factor is a “*mentally stored set of ideas or conceptual tool that assist individuals in their processing, understanding, interpretation, and evaluation of information*” (Entman 1993:52; Matthes, 2007). In order to relate media audience attitudes factors to media frames, a battery of Likert-scale measured attitude items was created for each of the nine media frames identified by Wolfram et al. (2021).

3.2 Reference study

Media frames are simplified patterns of interpretation of a complex social debate. No media content analysis of agricultural livestock farming in Germany were conducted before Wolfram et al. (2021). Consequently, the diversity and complexity of media frames may not have been sufficiently described before. Wolfram et al.’s (2021) study employed a manual dimension-reducing approach to empirically identify media frames of agricultural animal husbandry. The data set comprised 1,282 articles from the period 2010 to 2015, drawn from general print media, specialist agricultural media, and publications from non-governmental organisations (NGOs). A content analysis was employed to examine the constituent elements of a frame in isolation. The empirical determination of media frames was based on frame elements, which were subjected to a cluster analysis. The cluster analysis yielded nine markedly different media frames, indicating that agricultural animal husbandry is represented in print media through a multitude of interpretative frames. Wolfram’s et al. (2021) cluster analysis identified nine different media frames (MF):

- MF 1 Business benefits
- MF 2 Harm to agriculture
- MF 3 Image of agriculture
- MF 4 Consumer responsibility
- MF 5 Politics
- MF 6 Animal welfare

- MF 7 Livestock as polluter
- MF 8 Good husbandry practice
- MF 9 Society and animal husbandry

While some frames adopt an economic (MF1) and practice-oriented (MF8) perspective, others adopt a negative stance on the effects of animal husbandry (MF7), on animals (MF6) and emphasise consumers' responsibility (MF4). In another frame, agricultural animal husbandry is primarily reported on when there is a rationale to do so from a consumer perspective (MF9), in the context of political decisions (MF5) or when agriculture is harmed (MF2). Furthermore, the image of livestock farming (MF3) is also reported on in another frame. Individual media frames occur with greater frequency in certain media and in certain time periods. The empirical determination of media frames allowed for a more differentiated capture of the diversity of reporting on agricultural livestock farming than was previously possible and assumed. At the same time, the empirical approach to frame determination makes it possible to structure media coverage and make it accessible for in-depth analysis.

3.3 Survey instrument and survey implementation

The approach used to investigate the association between media frames and media audience attitude factors is that of a frame setting. The media frames correspond potentially to the media audience attitude factors via the topic perspective (Scheufele, 1999). For the present study, 4 to 7 items were formulated for each of these media frames (see table A1 in the appendix). These items aimed to reflect a particular frame. The formulation was based on the description of the media frame from the cluster analysis. Depending on the wealth of information available about the specific media frames and the possibility to formulate distinct attitudinal items, the number of items per media frame varied. This resulted in 43 items on attitudes to livestock farming. These 43 items of the media frames serve as the independent variables of the PCA. The 43 items were integrated into a panel survey on the topic of "Media and Agriculture" (cf. Bardusch et al., 2024). Participants were asked to indicate their agreement or disagreement with each item on a 5-point Likert scale. The survey was conducted by a market research company in early 2022 and included 1,800 participants. The survey was part of a panel, but for pragmatic reasons, this study is based only on the results of the latest wave of the panel in 2022. The survey is representative of the German population in terms of socio-demographic characteristics after considering weighting factors (Bardusch et al., 2022).

Socio-demographic details of the sample in comparison to the German population are provided in table A2 in the appendix.

3.4 Analytical approach

PCA has the advantage over factor analysis in this case that the variables can be highly correlated with each other. While preserving the information content, the analysis produces a set of principal factors as a kind of virtual variable. There is no correlation between the principal factors. Prior to PCA, the Kaiser-Meyer-Olkin (KMO) and Bartlett test was performed to determine the extent to which the analysis may be performed. The performance was confirmed by a KMO of 0.906 and a Bartlett significance of $p < 0.001$ (Izenman, 2008; Ringnér, 2008). PCA was then computed using promax rotation with Kaiser normalisation. The rotation converged after 11 iterations. After the first run, the item 'I know successful examples of new types of livestock farming' was removed as it was not interpretable. The PCA was repeated with 42 items, after which all items were interpretable. In the analysis, the 42 items on attitudes towards animal husbandry were grouped into main factors (cf. table A1 in the appendix).

The primary objective of this study was to explore the attitudinal patterns of media audience (media audience attitude factors) and determine the extent to which these patterns are associated with media frames from our previous study. As explained above, media frames refer to the specific ways in which printed news outlets present and contextualize information, potentially shaping how media audience perceives and interprets the issues at hand. To achieve this objective, the study employed a qualitative comparison between two key elements: media audience attitude factors and media frames. The degree of overlap between media audience attitudes factors and media frames was assessed based on the number of attitude items per media audience attitude factor linked to each media frame. If several attitude items in a specific media audience attitude factor could be traced back to a particular media frame, it was inferred that there was a strong association between that specific media frame and the corresponding media audience attitude factor. This indicates that the media frame is associated with or reflects the attitude patterns of media audience. Conversely, if only a few or single attitude items could be attributed to a specific media frame, it was concluded that there was a low association between the media audience attitude factor and that media frame, suggesting a weaker association or reflection of the media frame with public attitude patterns.

This comparison of media audience attitude factors and media frames allows for a qualitative assessment of the potential relationship between the two, providing insights into how closely public attitude patterns potentially mirror the narratives and themes promoted by the media. However, it is important to note the limitations of this approach. Given its qualitative nature, the analysis relies on interpretation rather than quantitative measurement. Moreover, while the study can identify associations between media frames and media audience attitude factors, it cannot establish causality. In other words, it cannot definitively determine whether the media frames really cause media audience attitudes or if they simply reflect pre-existing public sentiments.

4 Results and Qualitative Comparison with Reference Study

The principal component analysis (PCA) results in 8 factors that explain 53.57% of the total variance. Six out of eight factors have alpha values above 0.6. Normally, factors below 0.6 or items below 0.3 would be removed (Hair et al., 2013). Because of the exploratory approach and the comparison of similarities with the media frames, these factors were retained. The main factor loadings for each media audience attitude factor, as well as Cronbach's alpha, are presented in the appendix in table A1. The association between the nine media frames and the eight media audience attitude factors identified through PCA are summarized in table 1 and the association is further described in table 2. Four media audience attitude factors (F5, F6, F7, F8) have a strong overlap with respective media frames. Three media audience attitude factors (F1, F2, F4) refer to three or more different media frames and their overlap is rather fuzzy. The media audience attitude factors (F3) 'down-playing' has not any close reference in any media frame.

The first factor F1, '**Reputation of livestock farming**' (Cronbach's alpha = 0.857), contains 12 items, all of which load positively on the factor. It describes issues related to the reputation and image of agriculture, with items throughout being rather positive and supportive of farmers and livestock farmers. For example: "*Farmers contribute significantly to animal welfare through responsible animal husbandry*" (MF6). Other items contain references to what farmers can do, e.g. "*If farmers give more insight into their daily work, this [...]*" (MF3) helps to improve their reputation and image in society. There is also a call for greater recognition of the achievements

of livestock farmers (MF3). All items either reflect the positive and fundamental role of farmers or describe desirable actions and suggestions to improve farm animal husbandry. To reflect the relevance of the four items from MF3 and the supporting items such as "*The public settles disputes at the expense of farmers*" (MF9), the factor was named 'Reputation of livestock farming'. Four out of five items come from MF3 Image of Agriculture. Three items each from MF6 Animal Welfare and MF9 Society and husbandry and two from MF8 Good practice. These items complement each other in this factor. In addition to the call for greater recognition of the profession and the achievements of livestock farmers, recommendations for action are given on how to improve animal welfare and enhance the credibility of the industry. The media audience frame F1 has the largest overlap with MF3. The media frame MF3 deals, among other things, with the damage to the image of agriculture, public relations work and social debates about livestock farming. This frame often calls for better communication, more transparency and public relations (Wolfram et al., 2021). This is partly reflected in the media audience frame F1.

The second factor F2, '**Politics and business harm livestock farming**' (Cronbach's alpha = 0.676), addresses grievances caused by political or economic failures that have a negative impact on agriculture. All items are formulated in a rather negative way. On the one hand, politics is the cause of the problem: "*Politics does not intervene to improve the prices of animal products from agriculture*" (MF2). On the other hand, it is the food industry: "*The food industry is responsible for the poor conditions in which animals are kept in agriculture*" (MF1) and trade: "*By exporting animal products abroad, agriculture has become too dependent on foreign trade*" (MF2). Agriculture is more likely to be protected "*For financial reasons, farmers are often unable to implement new types of animal husbandry*" (MF8). The second media audience frame is also positive for agricultural actors. Livestock farmers are being defended and the economy, trade and politics are being strongly criticised. This main factor includes three of the four items from MF2 Harm to agriculture. It includes two items from MF1 Business benefits and one item from MF8 Good husbandry practices. In this media audience frame, the items almost flow together, but not all items from MF1 and MF2 are included. MF2 defines economic damage to farmers as an issue. This is caused by exports, by low producer prices or by the agricultural policy. Food industry (MF2 and MF1) are mainly responsible. The food

TABLE 1 Qualitative association of media frames and media audience attitude factors

Media audience attitude factors	Media frames								
	M1	M2	M3	M4	M5	M6	M7	M8	M9
	Business benefits	Harm to agriculture	Image of agriculture	Consumer responsibility	Politics	Animal welfare	Live-stock as polluter	Good husbandry practice	Society and animal
F1 Reputation of livestock farming			+++			+		+	+
F2 Politics and business harm livestock farming	+	+++						++	
F3 Down-playing		++				++	++		++
F4 Criticism of animal agriculture			++			+++			+++
F5 Innovative products	+++								
F6 Negative impacts of livestock farming							+++		++
F7 Powerless consumer				+++					
F8 Disenchantment with politics					+++				

Note: +++ strong overlap, ++ Overlap, + little overlap

Legend:

Media audience attitude factors (this study)

Media audience attitude factors

F1: Reputation of livestock farming

F2: Politics and business harm livestock farming

F3: Down-playing

F4: Criticism of animal agriculture

F5: Innovative products

F6: Negative impacts of livestock farming

F7: Powerless consumer

F8: Disenchantment with politics

Media frames (Wolfram et al., 2021)

MF 1 Business benefits

MF 2 Harm to agriculture

MF 3 Image of agriculture

MF 4 Consumer responsibility

MF 5 Politics

MF 6 Animal welfare

MF 7 Livestock as polluter

MF 8 Good husbandry practice

MF 9 Society and animal husbandry

industry (MF2 and MF1) as well as the political sector are attributed with the competence to solve the problem (Wolfram et al., 2021).

The third factor F3 ‘Down-playing’ (Cronbach’s alpha = 0.624) consists of several quite different items and has no any clear reference in a single media frame. Thematically, the items can best be classified as a continuation of the partly uninformed “Livestock farming has no negative impact on nitrate pollution of groundwater” (MF7) to ignorant down-playing opinions such as “New stables disfigure the rural area” (MF9). This is also illustrated by the item that food retailing ensures a good economic situation for farms with a fair price level (MF2). But there is also ambivalence about the down-playing:

“It is also difficult for farmers to judge whether the animals are really doing well” (MF6). There is one item each from MF9, MF6, MF7 and MF2 (compare table 1) that all load positively on this factor. The third main factor was not easy to interpret at first because of the seemingly very different items. However, with the term ‘Down-playing’ all items can be summarised well under this main factor. As the factor consists of one item from each of four different media frames, it cannot be clearly assigned to any one media frame. As with the factor F3 from the PCA, there is MF8 as a media frame that has no major correspondence to an media audience attitude factor.

The fourth factor F4, ‘Criticism of animal agriculture’ (Cronbach’s alpha = 0.717), is particularly concerned

with current social criticism. This refers to the negative impact of farming conditions on farm animals: “*Animals are in a very bad state because of irresponsible farming*” (MF6). In addition, there is a loss of understanding, trust and critical ethical-moral considerations. This principal factor is an expression of society’s tense to disturbed relationship with the current conditions of farm animal husbandry, which is predominantly practised according to legal minimum standards. Not only is the lack of animal welfare criticised: “*Farm animal husbandry is run as an unscrupulous business at the expense of the animals*” (MF6), but also a problem for society as a whole is highlighted: “*Farm animal husbandry raises moral questions*” (MF9). Open days at farms are no longer enough to improve the image and solve problems (MF3). The factor contains equal parts of items from MF6 Animal Welfare and MF9 Society and animal husbandry. Another item is based on MF3 Image of Agriculture. In MF6, the focus is often on the suffering and harm caused to animals by the conditions in which they are kept. Animal ethics or interventions on animals are often mentioned. Farming or politics are blamed for causing this. There are calls for more animal protection, more animal welfare, better housing conditions, better laws. The responsibility for finding solutions lies with both livestock farmers and politicians. Sometimes, however, improvements that have already been achieved are described, with benefits for animals that could have been achieved through husbandry or policy. In MF9, social damage is often addressed as problems that originate in agriculture or the food industry. Examples include food scandals, new livestock housing, demonstrations or rural development. The issues raised need to be seen in the context of society as a whole. It is therefore often unclear who has the authority to act and solve these problems. Mostly moral dilemmas are addressed and there are no or only unclear demands (Wolfram et al., 2021).

Factor five F5 ‘**Innovative products**’ (Cronbach’s alpha = 0.831) is about the interest in, consumption of or benefits from innovative foods. For example: “*I like to buy innovative foods*” (MF1). Or: “*New, innovative products promote the welfare of farm animals*” (MF1). The media audience frame F5 can be interpreted as an exclusively positive attitude towards innovative products. The interest in innovative products is clear and they are also associated with the promotion of animal welfare. Possible negative effects caused by food industry do not seem to matter. The peculiarity of the fifth factor is that it is composed of three items from MF1 Business benefits, which focuses on innovative products. The other two

items from MF1 do not load on Factor 5, but on Factor 2 Politics and business harm livestock farming. However, these items are worded in a negative way towards the food industry. This principal factor shows a clear overlap with MF1 but does not completely mirror it. The MF1 Business benefits, which is partly reflected in this factor, focuses on innovative products, labels or industry initiatives as well as the benefits for the animal by the food industry. The food industry is the cause of benefits and problems and also has the competence to find solutions (Wolfram et al., 2021).

Factor six F6 ‘**Negative impacts of livestock farming**’ (Cronbach’s alpha = 0.661) looks at livestock production as a cause of problems, whether it is the destruction of rainforests through animal feed, high greenhouse gas emissions or the promotion of resistant bacteria using antibiotics in livestock production (MF7). This frame reflects the negative assumptions and attitudes of the media audience towards farm animal husbandry. And thus, confirms the concerns of some agricultural stakeholders that media audience associate farm animal husbandry negatively. Problems related to farm animal husbandry, such as a lack of animal welfare, form the basis of media users’ attitudes towards this factor. This principal factor is very consistent with MF7 Livestock as a polluter. However, the factor also includes an item from MF9 Society and animal husbandry. This reflects the poor relationship between society and agriculture. At first sight does not seem to fit. The above-mentioned lack of reference to animal husbandry in society can also be interpreted as a consequence. In other words, today’s livestock farming is alienating society from agriculture. In the problem definition of MF7, the damage to society and the environment caused by animal husbandry is addressed. Stricter regulations and laws are demanded from politicians (Wolfram et al., 2021). The causes of the media audience frame and MF7 problems overlap considerably. However, the extent to which the media audience of this factor would demand similar solutions is unfortunately not reflected in the items.

The items of the seventh factor F7 ‘**Powerless consumer**’ (Cronbach’s alpha = 0.217) are all items from MF4 Consumer responsibility. They include negatively worded powerlessness items: “*Less consumption of animal products cannot improve animal husbandry*” (MF4). But also positively worded items on consumer power “*Responsible consumption of animal products can positively influence the conditions under which animals are kept*” (MF4). However, the positively worded items have a negative impact on this factor. The powerlessness and

helplessness of the consumer is therefore the focus here. In MF 4 Consumer responsibility, different dimensions are defined as problems, these can be animal ethics, resources, meat consumption or health and nutrition. The causes of the problems lie both in agriculture and in consumer behaviour. The call for action is usually directed at reducing the consumption of animal products or increasing the price of animal products. The competence to find solutions is seen to lie with consumers (Wolfram et al., 2021). Media audience seem to see this differently: The perceived powerlessness and helplessness of consumers is expressed here. It is clear that media users tend not to believe that consumers bear much responsibility. Nor do they believe that consumption can have a positive impact on the conditions in which animals are kept. This factor also highlights consumers' resignation that their actions could have a positive impact.

Factor eight F8 '**Disenchantment with politics**' (Cronbach's alpha = 0.309) also contains only items from one media frame, MF 5 Politics. Thematically, it negates the responsibility of politicians and the political scope for action or influence to improve the conditions under which farm animals are kept. For example: "*Politicians cannot contribute to animal-friendly farming*" (MF5). A more positive formulation, that politics determines the framework conditions for the keeping of farm animals, has a negative loading on the factor. Thus, the competence, responsibility and influence of politics in the area of farm animal husbandry is assessed as very low. In the media frame of politics, there are different problem definitions, often political debates, legislation or agricultural policy are in the foreground. Political actors are the cause of problems or benefits. In this frame, stricter laws, regulations and rules are usually demanded by politicians (Wolfram et al., 2021). All items in this frame load

TABLE 2 Qualitative association of media audience factors with respective media frames

Media audience factor	Comparison with respective media frame
F1. Reputation of livestock farming	Focuses on the positive image of agriculture, emphasizing farmers' contributions to animal welfare and transparency. Aligns strongly with MF3 "Image of Agriculture," which highlights transparency and public relations efforts.
F2. Politics and business harm livestock farming	Highlights negative impacts caused by political and economic factors, such as low prices and export dependencies. Aligns strongly with MF2 "Harm to Agriculture" frame but adds stronger emphasis on political inaction and trade dependencies.
F3. Down-playing	Represents minimizing or dismissive attitudes toward concerns about livestock farming. This factor shows minimal alignment with any single media frame.
F4. Criticism of animal agriculture	Reflects societal criticisms, including ethical concerns, moral questions, and dissatisfaction with farming practices. Aligns partly with the MF9 "Society & Animal Husbandry" and partly with MF6 "Animal Welfare" frames, focusing on ethical and moral concerns, but with a stronger critique of farming practices.
F5. Innovative products	Emphasizes interest in innovative food products and their perceived benefits for animal welfare. Overlaps mainly with MF1 "Business Benefits" frame by emphasizing interest in innovative foods, but excludes criticism of the food industry's potential negative effects seen in the media frame.
F6. Negative impacts of livestock farming	Addresses environmental and societal harms, such as pollution, greenhouse gas emissions, and antibiotic resistance. Corresponds closely but not completely to the MF7 "Livestock as Polluter" frame, addressing environmental harm, but also incorporates societal alienation from agriculture, which is less prominent in the media frame.
F7. Powerless consumer	Expresses consumer helplessness and skepticism about the effectiveness of individual actions in improving animal welfare. Aligns strongly with the MF4 "Consumer Responsibility" frame but emphasizes consumer helplessness rather than agency, reflecting skepticism about the effectiveness of individual action.
F8. Disenchantment with politics	Reflects disillusionment with politicians' ability to influence or improve animal husbandry practices. Mirrors strongly the MF5 "Politics" frame but focuses on disillusionment with political actors' ability to enact meaningful change, a sentiment less emphasized in the media frame.

the factor. However, media audience do not seem to be convinced that political actors can contribute to animal-friendly agriculture. They do not demand stricter or better framework conditions for livestock farming. Rather, they are disillusioned with politics.

Factor seven F7 'Powerless consumer' and factor eight F8 'Disenchantment with politics' reflect a sense of disillusionment and perceived lack of agency among the media audience, where F7 represents consumer helplessness in affecting meaningful change through individual choices, aligning with the consumer responsibility narrative (MF 4). Similarly, F8 captures skepticism or disappointment with political processes, suggesting that institutions are seen as ineffective in addressing important issues, leading to potential disengagement or cynicism. Both factors highlight a subset of the audience that feels alienated from both consumer and political solutions to social or environmental challenges. It is important to note, however, that both F7 and F8 contribute only marginally to the explanation of the overall variance, as they exhibit relatively small factor loadings. This indicates that while these attitudes exist within the media audience, they are less central or less widely held compared to other factors. Nonetheless, the presence of these factors highlights a segment of the media audience that experiences frustration with both consumer responsibility narratives and political solutions. This nuanced insight could imply that while these attitudes are not dominant, they represent a specific and potentially influential subset of the population that may be particularly critical of current consumer and political frameworks. Both F7 and F8 have clear correspondence to specific media frames each, recognizing this disillusioned subset is well recognized in media reporting and their concerns are acknowledged.

5 Discussion

The aim of our study was to analyse if distinct attitudinal patterns of media audience exist (hypothesis 1) and if these media audience attitude factors are associated with media frames (hypothesis 2) about farm animal husbandry. For this purpose, a comprehensive online survey ($n = 1,800$) in Germany explored media audience attitude patterns towards livestock farming and their association with media frames. Using a principal component analysis (PCA) based on Likert-scale measured attitudes, eight media audience attitude factors were identified, partly corresponding with nine media frames from a prior media content analysis (Wolfram et al.,

2021). Our results show partial overlap between media audience attitude factors and media frames: four media audience attitude factors align with four media frames, three factors linked to multiple media frames with less clarity, and one factor showed no association. The results indicate that media audience' attitudinal patterns are fuzzy based on our attitude item batteries. Only few items derived from specific media frames belong to specific media audience' factors. Several media audience attitude factors consist of items from different media frames. So hypothesis 1 can only be confirmed partly.

On a qualitative-content level there are similarities between media frames and media audience' attitude factors. While media frames have a stronger societal-economy-wide perspective, media audience attitude factors display a stronger focus on individual perspectives and individual concerns. Media audience attitude factors are less confrontational and less reproaching towards livestock farming. Factors that consist exclusively of items of a media frame can be interpreted as less neutral or multi-layered than media frames. This might indicate a qualitative association of media frames and media audience' factors, even though the media frames are not as clearly reflected in the media audience attitude factors as expected. So with regards to hypothesis 2, there is only a loose association with the media frames. It can therefore be concluded that hypothesis 2 is only partially confirmed, too.

As media frames can increase the individually perceived importance of topics (Nelson et al. 1997) and as individuals use media in specific ways, not all frames may have an equal influence on the salience of a topic. In our previous study on media frames (Wolfram et al., 2021), we were able to show that certain media frames occur more frequently in certain print media and at certain times. Due to people's preferences for certain media brands, they may primarily consume only a few media frames. This can lead to the individual impression that the media report one-sidedly on certain topics (Wolfram et al., 2021). In many ways, mass media are involved in the political, social and private life of today's societies. A fact that encourages and fosters speculation about media effects (Hasebrink, 2002). However, the effects of the media are fleeting, often subjective and can only be directly experienced in rare cases. The negative influence as well as the potential impact of the media is often overestimated, which frequently leads to a scapegoat role for the media (Bondadelli and Friemel, 2017).

Media give suggestions on what to think about and possibly also how media audience could think about the respective topics. Media, however, do not prescribe

what one should think about – even though this distinction is not always easy to maintain in media impact research. In this context, the positive effects and code-of-conduct journalistic norms of print media should be remembered. Media can be seen as moderators, opinion enablers or amplifiers of a critical and hopefully informed public (Kothe and Mergenthaler, 2020; Jarren and Wessler, 2002). They serve to convey information and knowledge as well as education, e.g. animal welfare awareness. In this way, they enable media audience to participate in democratic processes and inform social discourse (Hansebrink, 2016). Depending on how a topic is presented and the associated media impact is perceived by the media audience, the journalistic handling of it appears as socially desirable or undesirable. Especially with socially problematic topics, the question of socially desirable or undesirable media impact is polarising (Bondadelli and Friemel, 2017). More media impact field experiments would be needed to better understand the effects of media reports related to livestock on media audience' attitudes.

There is a prevalent perception among stakeholders in the agricultural sector and segments of society that the media often portrays livestock farming in a negative and polarizing manner. This perception aligns with the media's tendency to prioritize sensational and negative news stories, encapsulated in the adage "only bad news is good news" (Kothe and Mergenthaler, 2020; Bondadelli and Friemel, 2017). This dynamic suggests that the media is not entirely blameless for being cast in the role of a scapegoat. Moreover, empirical evidence suggests that media audiences, as media consumers, are more likely to engage with articles that carry negative connotations, which in turn can shape their attitudes in a more critical direction (Wolfram et al., 2021). The potential influence or shared responsibility of the media in shaping public opinion about livestock farming practices should be borne in mind (Bondadelli and Friemel, 2017). However, the process of opinion formation is complex and multifaceted. It is not solely driven by media exposure but is also an interplay of personal experiences, social interactions, individual values, life situations, and accumulated knowledge and previous experiences (Hansebrink, 2016). This suggests that while the media can amplify certain narratives and influence public discourse, the ultimate formation of opinions is deeply rooted in the broader context of individuals' lives and their interactions within their social environments. Future research should consider these multidimensional factors to better understand the different ways in which media influences public attitudes towards livestock farming.

Taken together, it appears that media audience possess their own unique interpretation frameworks, rather than merely adopting those presented by the media. The linearity of media frames is not a universal or unidirectional phenomenon. Although the representation of events in the media is inherently biased, as it seeks to facilitate media audience engagement by making knowledge units more accessible or recalling them, it would be erroneous to assume that media audience are mere conduits for the information they consume. Rather, the information is placed within audience' own interpretive frames and horizons of meaning through their own context and preferences (Matthes, 2009). Prior analyses indicate that media audience, particularly younger individuals and those with higher education, engage in critical questioning of the reporting in relation to its attitude of use (Bardusch et al., 2024). A comparison of the media audience attitude factors and the media frames reveals a discrepancy in their respective approaches to the occurrence of a problem and the responsibility for its resolution. Despite the fact that almost all items pertaining to a media frame are depicted in a media audience frame, the responsibility attributed to media audience differs from that attributed to them in the media frame.

The extent to which media audience adopt the interpretive frames proposed by media is a matter of debate. As members of society, journalists are subject to the same interpretative frames as other media audience, and thus media frames are shaped by their interpretative frames. Kothe and Mergenthaler (2020) point out that journalists are not free from influence when reporting on livestock farming. Journalists, like their media audience, are influenced by prevailing societal attitudes, norms, and values. Their reporting on livestock farming is thus shaped by the same cultural and social factors that shape public opinion. This means that the frames journalists use to structure their stories are not solely a product of editorial decisions or journalistic norms but are also reflective of broader societal discourses and concerns. For instance, if there is a growing public concern about animal welfare, journalists might be more inclined to highlight stories that reflect these concerns, even if they do not consciously aim to influence public opinion in a particular direction. Moreover, pre-existing beliefs, knowledge, and attitudes play a crucial role in how media messages are received and interpreted within media audience attitude factors (cf. Happer et al., 2016). When journalists frame a story about livestock farming, they do so with an understanding of these media audience' factors, aiming to resonate with or challenge them. The resulting media frames are therefore both a

response to and a reinforcement of these media audience attitude factors (Cacciatore et al., 2016).

Complex interactions of media content producers and media consumers create a feedback loop where media frames and media audience attitude factors continually influence each other. Rather than a one-way causation where media frames shape public opinion in isolation, there is a dynamic interplay where public sentiment influences media reporting, and this reporting, in turn, feeds back into public sentiment. This cyclical relationship underscores the need to understand media effects as part of a broader socio-cultural process. For example, if a significant portion of the public starts viewing intensive livestock farming critically due to concerns about animal welfare, environmental impact, or health risks, media are likely to reflect these concerns in their reporting. This coverage can then reinforce and amplify these public concerns, creating a more pronounced societal discourse around these issues. Therefore, understanding the relationship between media frames and media audience attitude factors requires acknowledging that media and media audiences are embedded in the same social realities. The framing of livestock farming in the media is not just an imposition of journalist perspectives on the public but is also a reflection and amplification of existing public concerns and attitudes. This bidirectional influence highlights the complexity of media effects and the importance of considering the broader social context in which both media production and consumption occur.

6 Limitations

Our study is not without critical limitations. A main limitation of this study lies in the formulation of survey items intended to reflect media frames. As certain items were inadequately constructed, they resulted in imprecise representations of media frames. Lack of operational precision in defining and measuring frames is well-known. Matthes (2009) points out that the inconsistent use of framing concepts and the insufficient reporting of reliability in framing studies can undermine the robustness and comparability of findings. These methodological shortcomings highlight the need for clearer operational definitions and more rigorous standards in framing research to enhance the validity and reliability of results. Therefore, while media frames can profoundly influence media audience cognitions and behaviors, the process is mediated

by individual interpretive frameworks. Methodological advancements, such as semantic network analysis and comparative frame analysis, offer valuable tools for examining these effects, though challenges in operational precision and reliability remain.

For better interpretation in the PCA, one item – deemed unsuitable due to its focus on factual knowledge rather than audience attitudes – was removed. Additionally, Cronbach's alpha values for some factors remained below 0.6, though these were retained due to the exploratory nature of our approach. In several cases, unclear items led to overlaps, and clearer delimitation could have been achieved by aligning items with frame elements, such as problem definition, causes, calls to action, and solutions. This lack of clear boundaries compromised the clarity and distinctiveness of individual media audience factors, thereby affecting the robustness and reliability of the analysis. In addition, one media frame was intended to be represented by seven items in the survey, while other media items were only represented by four survey items, introducing a potential distortion. Thus, balancing the number of items per frame would have been preferable. Consequently, the observed ambiguity in media audience attitudinal factors limited the study's ability to draw conclusions regarding the relationship between media frames and public attitudes. Future research might explore how audience factors shift when reliability exceeds 0.6 for all factors. Enhancing the formulation of items and employing more rigorous methodological approaches could improve the precision of media frame representation in survey items and facilitate more accurate analysis of their impact on audience attitudes. Furthermore, given that all authors were familiar with the media frames, there is potential for interpretative bias in audience factor analysis. To mitigate this, an independent person unfamiliar with the media frames also interpreted the results, which closely aligned with those of the authors.

A further limitation of our study lies in its exclusive focus on print media, thereby excluding radio, television and probably more importantly social media. Given the rapidly evolving media consumption patterns, it would be crucial to consider these other media forms when examining the association between media and public attitudes. Additionally, our analysis of written media did not account for the influence of accompanying images, which, for pragmatic and analytical reasons, were omitted. The potential impact of images, especially when combined with text, should not be underestimated, as they can significantly alter the media

audience's perception and interpretation of written content. Furthermore, the effects of media are inherently intertwined with the media audience's memories and pre-existing attitudes. This interrelationship must be carefully considered when interpreting the results, as it can influence how media content is received and processed by different individuals (Matthes, 2009; 2014). Addressing these limitations in future research would provide a more comprehensive understanding of media influence on public attitudes.

7 Conclusions and Recommendations

Our study analysed media audiences' attitudinal patterns and their association with media frames. The findings suggest that media audiences' attitudinal patterns only loosely correspond to media frames. This implies that media audiences develop their own interpretive frameworks rather than simply adopting media narratives. Media audiences, especially younger and more educated individuals, critically evaluate media reports, showing that they are not passive recipients of information. Depending on individual media consumption preferences, the influence of media frames on different segments of the media audience may vary. Therefore, some more general recommendations can be derived: For the livestock sector, it is essential to proactively engage with the media to ensure balanced reporting, increase transparency in farm animal husbandry practices to build trust, and invest in public relations campaigns to highlight realistic aspects of livestock farming. Livestock farmers should focus on effective communication with the public and the media, adopt sustainable and animal-friendly husbandry practices and engage with local communities to build understanding and address concerns directly. Policy makers should support livestock production with higher animal welfare standards through appropriate policies, support balanced media coverage of agricultural issues and fund educational initiatives to improve public understanding of farm animal husbandry practices and animal-based food production. Animal welfare NGOs should work with farmers to promote animal welfare, conduct public awareness campaigns on responsible consumption and advocate for more effective animal welfare policies. Future research should include more media impact experiments to understand the effects of media coverage on public attitudes towards animal farming, longitudinal studies to track media-induced changes in public

attitudes over time, and analysis of a wider range of media sources, particularly social media.

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Transparency

Different AI-tools were used to facilitate the literature review, text generation and text editing.

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Appendix

TABLE A1 Principal component analysis (PCA) loadings for all factors, Cronbach's alpha

Name of the main component and statements	Mean value	Std. deviation	Promax rotated principal component loading and Cronbach's alpha							
			α 0.857	α 0.676	α 0.624	α 0.717	α 0.831	α 0.661	α 0.217	α 0.309
F1 Reputation of livestock farming										
MF6. Farmers make a significant contribution to animal welfare through responsible animal husbandry.	3.420	0.901	0.738	-0.089	-0.173	0.161	-0.088	0.060	0.056	-0.093
MF9. Ideal farm animal husbandry can reconcile societal and economic interests.	3.650	0.841	0.732	-0.140	-0.161	0.183	0.036	-0.007	-0.071	-0.011
MF3. If farmers provide more insight into their daily work, this helps to convey a positive image of farm animal husbandry.	3.320	0.898	0.724	0.027	-0.114	0.203	-0.018	-0.136	-0.098	0.110
MF8. New techniques and methods can improve animal welfare in agriculture.	3.940	0.919	0.698	-0.272	-0.142	0.031	0.068	0.194	0.015	-0.069
MF3. When farmers stand up for animal husbandry, this contributes credibly to a better image of animal husbandry.	3.250	0.823	0.649	0.096	0.052	0.057	0.006	-0.201	-0.136	0.043
MF6. Certain labelling on animal products is intended to promote the welfare of farmed animals.	3.860	0.881	0.623	-0.050	0.012	0.254	0.046	-0.019	-0.187	-0.142
MF3. The profession of farmer as keeper of farm animals deserves more recognition.	3.630	0.914	0.574	0.342	-0.189	-0.071	-0.001	-0.123	0.003	0.001
MF9. Farmers reliably provide society with healthy food.	3.640	0.829	0.557	0.031	-0.012	-0.292	-0.028	0.095	0.025	0.043
MF3. Farmers generally treat farm animals responsibly.	3.070	0.825	0.548	0.033	0.096	-0.417	-0.030	-0.025	0.080	0.028
MF6. Farmers responsibly ensure good husbandry conditions for animals.	3.640	0.828	0.531	0.051	0.252	-0.344	-0.028	0.007	0.081	0.018
MF8. Livestock farmers take excellent care of their animals.	3.340	0.949	0.453	0.008	0.278	-0.425	-0.027	0.007	0.041	0.058
MF9. The public settles disagreements at the expense of farmers.	3.500	0.860	0.329	0.264	0.102	-0.075	0.015	0.050	0.186	0.118
F2 Politics & business harm livestock farming										
MF2. Policymakers do not intervene to improve prices for farm animal products.	3.980	0.940	-0.113	0.756	0.006	0.123	0.005	-0.028	0.045	-0.167
MF2. Export of animal products abroad has made agriculture too dependent on foreign trade.	3.410	0.892	-0.077	0.676	0.163	0.232	0.050	-0.173	0.197	-0.067
MF2. Low prices for animal products put too much pressure on farms.	3.680	0.949	0.116	0.624	-0.139	0.013	0.046	0.025	-0.136	-0.093
MF1. The food industry is responsible for the poor husbandry conditions of animals in agriculture.	3.210	0.975	-0.062	0.501	0.075	0.204	0.146	0.063	-0.158	0.204
MF1. Novel foods only benefit the food industry.	3.460	0.906	-0.019	0.462	0.228	0.055	-0.122	-0.081	0.030	0.431
MF8. Due to financial reasons, farmers often cannot implement new ways of keeping animals.	3.740	0.917	0.123	0.435	0.006	-0.203	-0.007	0.222	0.065	-0.145
F3 Down-Playing										
MF9. New stables disfigure rural areas.	2.430	1.047	-0.291	0.088	0.757	0.095	-0.046	0.125	0.011	0.130
MF6. It is difficult even for farmers to judge whether animals are really doing well.	2.550	1.023	-0.121	0.114	0.731	0.081	-0.095	0.037	0.018	0.159
MF7. Farm animal husbandry has no harmful effects on nitrate pollution of groundwater.	2.400	1.074	0.176	0.060	0.486	0.134	-0.049	-0.469	0.092	0.172
MF2. Food producers and food retailers ensure that farms are doing well economically through fair prices.	2.330	1.045	0.170	-0.299	0.428	0.077	0.223	-0.118	0.223	-0.092
F4 Criticism of animal agriculture										
MF6. Animals are doing very badly because of irresponsible husbandry.	3.640	0.916	0.049	0.029	0.098	0.715	0.005	0.171	0.048	0.073
MF6. Farm animal husbandry is run as an unscrupulous business at the expense of the animals.	3.490	0.980	-0.056	0.217	0.255	0.701	-0.121	0.113	-0.024	0.005
MF9. Food scandals have damaged consumer confidence in farm animal husbandry.	3.470	1.020	0.289	0.085	-0.118	0.462	-0.006	0.112	0.203	-0.085
MF3. "Open days" on farms are not enough to portray the image of farm animal husbandry in a more positive light.	3.370	0.992	0.221	0.304	-0.057	0.449	0.040	-0.119	0.150	0.029
MF9. Farm animal husbandry raises moral questions.	3.640	0.901	-0.136	0.123	0.302	0.434	0.024	0.314	-0.038	-0.135
F5 Innovative products										
MF1. I like to buy innovative food.	3.080	1.032	-0.083	0.076	-0.060	-0.064	0.990	-0.003	0.053	0.081
MF1. I am interested in innovative food.	3.030	0.998	-0.082	0.072	-0.106	-0.064	0.974	0.045	0.067	0.014
MF1. New, innovative products promote the welfare of farm animals.	3.130	0.911	0.176	-0.006	0.035	0.056	0.676	-0.053	-0.012	-0.017
F6 Negative impacts of livestock farming										
MF7. Farm animals are increasingly fed with soy from overseas. Rainforest is destroyed in to gain land for cultivation.	3.870	0.964	-0.036	0.037	0.041	0.154	-0.012	0.691	-0.012	0.149
MF7. Farm animal husbandry contributes to high greenhouse gas emissions.	3.680	0.958	-0.144	-0.023	0.170	0.046	0.122	0.689	-0.043	-0.159
MF7. The use of antibiotics in farm animal husbandry promotes resistant germs.	3.510	1.003	0.117	-0.128	-0.032	0.195	-0.078	0.667	-0.088	0.109
MF9. Society has less and less connection to agriculture.	3.930	0.874	0.235	0.225	-0.236	0.090	-0.072	0.334	0.068	0.131
F7 Powerless consumer										
MF4. Less consumption of animal products will not improve animal husbandry.	3.660	0.935	0.078	0.088	0.042	0.064	0.037	-0.044	0.771	-0.047
MF4. Consciously changing purchasing decisions cannot improve the welfare of animals in agriculture.	3.280	0.992	-0.111	0.116	0.233	0.086	0.096	-0.022	0.756	-0.014
MF4. Responsible consumption of animal products can positively influence the conditions under which animals are kept.	3.000	1.142	0.318	0.190	0.076	0.012	0.131	0.113	-0.472	-0.028
MF4. By buying more expensive animal products, farm animals can be given a better life.	2.850	1.124	0.271	0.145	0.333	-0.002	0.061	0.077	-0.454	-0.084
F8 Disenchantment with politics										
MF5. Politicians cannot contribute to animal-friendly agriculture.	3.610	0.890	0.028	-0.163	0.444	0.041	0.014	0.137	0.063	0.702
MF5. Ensuring good conditions in farm animal husbandry is not the task of politicians.	2.380	1.221	0.138	-0.334	0.479	0.062	0.058	0.099	0.036	0.596
MF5. Politics determines the framework conditions for farm animal husbandry.	2.400	1.141	0.248	0.059	-0.001	0.166	-0.118	0.267	0.323	-0.475
MF5. Politicians are too far removed from agricultural practice.	3.970	0.966	0.129	0.302	-0.260	0.037	0.096	0.215	0.130	0.366

Note: MF is abbreviation for "media frame" from the reference study of Wolfram et al. (2021).

TABLE A2 Comparison of sample with German population (census) in percentages

		Sample (n = 1800)	German population	
Age	18–22	8.2	4.0	
	23–32	19.5	12.0	
	33–42	18.3	12.9	
	43–52	19.1	12.5	
	53–62	20.4	16.1	
	63–72	14.4	13.0	
Gender	male	44.6	49.3	
	female	55.6	50.7	
	diverse	0.1	.	
Education#	No school-leaving certificate, still in school education, secondary school leaving certificate/ elementary school leaving certificate	35.9	32.6	
	Secondary school leaving certificate, polytechnic secondary school or equivalent	31.5	30.0	
	Advanced technical college entrance qualification or general higher education entrance qualification	32.7	33.5	
	Not specified	0.6		
Household size#	Households with 1 person	24.9	42.3	
	Households with 2 persons	37.5	33.2	
	Households with 3 persons	18.6	11.9	
	Households with 4 persons	12.4	9.1	
	Households with 5 or more persons	6.0	3.5	
	Not specified	0.6		
Occupation+	Employed	Full-time employed	42.8	45.1
		Part-time employed	13.8	
		Self-employed	4.5	4.8
	Unemployed Non-employed persons	Apprentice	2.4	1.9
		(currently) without job	9.1	1.7
		Student	5.7	46.5
		Retired	16.3	
		Housewife, Househusband	5.7	
Household income#	up to 1.499 €	23.8	23.8	
	1.500 up to 2.599 €	27.0	29.9	
	2.600 up to 3.199 €	11.6	11.4	
	3.200 up to 4.499 €	14.4	16.7	
	4.500 € and more	13.4	15.9	
	Not specified	9.9	2.3	
Living area#	Rather metropolitan (more than 100,000)	31.1	34.1	
	Rather small towns (5,000–100,000)	53.5	53.0	
	More rural (less than 5,000)	15.4	12.7	

Sources: + Statistisches Bundesamt (2020), * Statistisches Bundesamt (2021), # Statistisches Bundesamt (2022a, b, c)