



A cute little grasshopper on the front? A qualitative study of consumers' perceptions and expectations of insect-based food labelling in Germany

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ABSTRACT

To increase acceptance of insect-based foods, producers often apply a “hidden-is-best” principle, using less visible insect contents in processed products. Regulations ensure such contents are included in ingredient lists. However, widespread disinformation about “hidden insects in food” indicates a disparity between consumer expectations and labelling practices, showing the need for deeper insights into consumers' perspectives. This study presents insights from six focus-group discussions in four German cities ($N = 50$), exploring consumer perceptions and expectations of the presence and presentation of front-of-package insect-labelling. Our findings confirm that many consumers fear “deception” and expect greater transparency through easily recognizable indications of insect-based ingredients on front-of-package labelling using familiar insect names and understandable language. Although the term “protein” on insect-labelling was widely appreciated, we could not find a “one-size-fits-all-solution” for label formatting. The present study offers practical recommendations for marketers, including the development of standardized front-of-package insect-labelling, designed in closer alignment with consumer preferences.

1. Introduction

As a promising sustainable alternative source of protein, edible insects have attracted growing attention from researchers and actors in the food industry, with heightened interest also evident in the media (Bashi et al., 2019; Canetta, 2023; Ledesma-Chaves et al., 2024). The environmental friendliness of insect-farming and the nutritional comparability of insects to conventional meat are widely viewed as opportunities to help solve growing environmental and health concerns about the production and consumption of animal protein (Lange and Nakamura, 2023; Nowakowski et al., 2022). However, lack of consumer acceptance in Western countries remains a major challenge for the commercialisation of edible insects (van Huis and Rumpold, 2023). Reviews of existing consumer studies concluded that one promising strategy to reduce insect consumption barriers is to include insects as invisible ingredients in highly processed food (Alhujaili et al., 2023; Puteri et al., 2023). However, such “invisibilization” has important implications for labelling, including the need to overcome consumer fears of unknowingly eating insects.

The incorporation of insect-based ingredients in a less visible way

makes it all the more important for labelling to inform consumers of the presence of these ingredients. Indeed, although the Novel Food Regulation (EU) 2015/2283 already requires that such ingredients be clearly indicated in ingredients lists on packaging, concerns about insect-based food (IBF)¹ and non-transparent labelling persist among EU citizens. These are reflected and exacerbated by the proliferation of “fake news” claims, including the claim that IBFs are only labelled using the Latin names of insect species (Canetta, 2023; European Newsroom, 2023). Such fears highlight the need to attain a better understanding of consumer expectations and preferences regarding insect-labelling and how this should be presented on food packaging.

Several quantitative studies have investigated how different ways of presenting information about insect contents affect levels of acceptance or aversion towards IBF (e.g., Bruckdorfer and Büttner, 2022; Goncinkowska et al., 2023; Marquis et al., 2023). However, no study has yet specifically explored consumer perceptions and expectations of front-of-package (FOP) labelling on IBF. To address this research gap, we conducted a qualitative study based on six focus-group discussions with German consumers. The following research questions guided our study:

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¹ Abbreviations: IBF – insect-based food; FGD – focus-group discussion; FOP – front-of-package

1. How do consumers perceive the need for FOP insect-labelling?
2. Which advantages and disadvantages do consumers associate with FOP insect-labelling?
3. What characteristics do consumers consider necessary for the presentation of such labelling?

The main objective of the present study was to gain an in-depth understanding of consumer perceptions and expectations regarding the presence and presentation of FOP insect-labelling. Our empirical findings provide valuable insights for food industry actors and policy-makers in developing consumer-oriented insect-labelling strategies. Informed by these insights, producers can better strike a balance that harnesses the potential of FOP insect-labelling as a tool both for information and marketing.

2. State of the art

Like all other food products, any IBF marketed within the EU is subject to strict legal regulations requiring food businesses to ensure the labelling of their products is not misleading and that all information is accurate, indelible, clear, and easy to understand for consumers (Regulation (EU) No 1169/2011). Regulations specifically related to IBF stipulate that information about the inclusion of insects be clearly and legibly indicated in ingredients lists with both the Latin (scientific) and common name of the species as well as the form in which the insect is used, e.g., “*Acheta domesticus* (house cricket) partially defatted powder” (Regulation (EU) 2023/5). In light of scientific evidence of potential allergic cross-reactivity, producers are further required to provide information on packaging about possible reactions to insects in case of allergy to crustaceans, molluscs or dust mites (International Platform of Insects for Food and Feed, 2019).

In practice, most IBF businesses in Europe already voluntarily include direct references to insects, either in the names of their products or in the form of words, pictures and graphics on FOP designs and labelling (Cervera, 2023b). This serves to provide consumers with transparent information with the aim of reducing their reservations (Daub and Gerhard, 2022). However, given the low acceptance of entomophagy (i.e., the practice of eating insects) among Western consumers, such FOP insect-labelling could also lead to consumers rejecting the product (Cervera, 2023b; Naranjo-Guevara et al., 2023).

The question thus arises as to which kinds of information and labelling are most likely to produce positive effects. Prior studies adopting a quantitative approach to this question have confirmed that variations in labelling/not labelling have significant impacts on consumers’ acceptance/rejection of IBF. The authors showed that consumers not only expected food labelled as containing insects to taste worse (Goncikowska et al., 2023), but also consumed them in smaller quantities although they did not actually contain any insects (Modlinska et al., 2020). However, the combined results of existing studies on insect-labelling do not provide a consistent or conclusive answer. This is because the focus of such quantitative research was on identifying consumers’ responses to and preferences for a predefined selection of labelling formats, mainly limited to choices between textual descriptions and graphics or between realistic versus “cute” or stylised images of insects. For example, the use of realistic images of insects has been found to increase perceptions of risk and even levels of disgust, with correspondingly reduced expectations of tastiness and lower likelihood of purchase (Baker et al., 2016; Goncikowska et al., 2023; Pozharliev et al., 2023). Based on these findings, Baker et al. (2016) and Goncikowska et al. (2023) have advocated the use of textual descriptions instead of insect images in retail settings. Meanwhile, other studies have found that “cute” insect images can mitigate some of the negative emotions related to insect consumption (Bruckdorfer and Büttner, 2022; Marquis et al., 2023; Pozharliev et al., 2023). This finding has led Marquis et al. (2023) to advocate the use of more stylized insect images on food packaging.

In sum, the results of the cited quantitative studies are still limited

and sometimes contradictory, hence the necessity of the present study. With the qualitative study presented in this paper, we set out to identify the underlying reasons behind consumer expectations and preferences vis-à-vis insect-labelling. In-depth insights and understanding on these topics constitute a crucial first step for informing the development of more effective FOP insect-labelling that is designed in closer alignment with consumer demands.

3. Materials and methods

Our study draws on analysis of data from six focus-group discussions (FGDs) conducted in Germany in April 2023. To elicit a broad range of consumer experiences and perspectives and ensure the inclusion of people from different parts of Germany, two FGDs were held in Kassel (western-central) and Dresden (eastern) and two each in the larger cities of Hamburg (northern) and Munich (southern), given their larger populations.

3.1. Participants

The focus-group participants were recruited from the consumer panel of a market research agency, with eligibility criteria stipulating that all participants needed to be i) at least partly responsible for grocery shopping and meal preparation in their household, ii) fluent in German, iii) not working in the market research sector, and – since product-tastings were also intended – that they were iv) willing in principle to sample a food product during the discussion, v) not allergic or intolerant to any kind of foods, and vi) neither pregnant nor breastfeeding.

Sociodemographic data were also collected, not only to ensure gender balance and a diverse mix of ages but also to ensure that at least 25 % of participants were from suburban or rural areas. Our final sample comprised 50 participants, with each FGD including 6–11 participants

Table 1
Characteristics of study participants (N = 50).

		N	Overall (%)
Gender	Female	23	46
	Male	27	54
Age (years old)	18–29	10	20
	30–39	7	14
	40–49	10	20
	50–59	14	28
	60–75	9	18
Place of residence	City	21	42
	Suburban or rural areas	29	58
Hometown (population)	Rural area (<5000)	11	22
	Small city (5000–19,999)	8	16
	Mid-sized city (20,000–99,999)	5	10
	Big city (100,000–499,999)	2	4
Meat consumption	Metropolitan (≥500,000)	24	48
	Every day	2	4
	3–6 days per week	20	40
	1–2 days per week	15	30
	Less than 1 day per week	8	16
	Vegetarian	4	8
Familiarity with the use of insects as food for humans	Vegan	1	2
	Never heard of it before	1	2
	Heard of but never eaten insect-based food	42	84
	Have eaten insect-based food once	6	12
	Occasionally eat insect-based food	0	0
	Regularly eat insect-based food	1	2
Willingness to try insect-based food products	None	18	36
	1–2 products	10	20
	3–5 products	12	24
	6–11 products	10	20

(see Table 1).

3.2. Study design and procedure

The FGDs were moderated using semi-structured guidelines with a set of predetermined open-ended questions in German (See Supplementary Material for the guideline). These guidelines were initially tested in a trial FGD in a university setting (Data from this pilot FGD were not used in our analysis).

Prior to the FGDs, participants were informed via email about the nature, scope and aim of the study as well as the use of audio-recording during discussions. To avoid bias and ensure the inclusion of consumers with varying levels of acceptance of IBF, participants were initially only informed in general terms that the study was about consumer acceptance of food. Only when the discussions began did the participants realise the focus was on IBF.

The FGDs were moderated by a research associate and supported by an assistant responsible for logistics such as distributing questionnaires and food samples during sessions. Each session began with a brief explanation from the moderator of the ground rules of discussion, followed by a short round of introductions as an icebreaker. The remainder of the sessions consisted of three parts: (i) an FGD on the research topics; (ii) a self-administered paper-and-pencil questionnaire; and (iii) optional product-tasting.

Although other topics were discussed in these FGDs as part of a wider research project, the present paper focuses only on points arising from discussions regarding the labelling of IBF.² For these discussions, an insect-based burger and an insect-based protein bar were selected from the product-range of the Swiss start-up *Essento* (<https://essento.eu/>), representing two of the most common types of IBF products sold in Germany. For our research purposes we completely removed the original front-of-package insect-labelling on both products.³ As shown in Fig. 1 (products *a* and *b*), the inclusion of insects was thus indicated only in the ingredients list on the back of the packaging of the products presented to the participants: “mealworm” in the case of the burger, and “cricket powder” in the case of the protein bar. The participants were then asked to discuss their perceptions of this type of non-FOP insect-labelling, including their views on how FOP insect-labelling should be presented.

Participants were subsequently shown pictures of two insect-based protein bars with ingredient lists edited to include either “cricket powder” or “cricket protein” (products *b* and *c* in Fig. 1) and asked to share their perceptions of the labels. Here the purpose was to explore consumer perceptions of labels highlighting insect protein to assess the potential attractiveness of using protein concentrates and/or isolates from insects to enrich food products. Identifying such perceptions is especially relevant given global trends towards consuming high-protein products (Madeiros et al., 2024).

After the discussion, the participants completed a short questionnaire eliciting sociodemographic information and their current levels of meat consumption and familiarity with eating IBF. The questionnaire also invited participants to select which IBFs they would be willing to try from a range of 11 products already available on the Western market, including the option of choosing ‘none’ (See Supplementary Material for the questionnaire). Each session ended with an optional tasting of the insect-based protein bar. The sessions lasted an average of 77 min and

were audio-recorded in their entirety.

3.3. Data analysis

The audio files from the FGDs were transcribed verbatim and analysed using MAXQDA 2022 software (VERBI Software, 2021), while data from the self-administered questionnaire were analysed descriptively (see Table 1). We analysed the transcribed FGD data using thematic qualitative text analysis in accordance with guidelines developed by Kuckartz (2019). The categories and sub-categories were formed through a combination of concept-driven (deductive) and data-driven (inductive) approaches in a reiterative process, with adjustments made to the coding frame throughout the coding process, resulting in re-coding of the already coded transcripts (See Table 2 for the coding frame).

To ensure the consistency and transparency of the coding frame, an intercoder reliability assessment was conducted according to the guidelines provided by O’Connor and Joffe (2020). Two FGD transcripts (i.e., Hamburg_2 and Munich_2) were independently coded by a second coder using the frame created by the first coder. With a minimum code overlapping rate of 95 %, the percentage of agreement calculation resulted in 82.22 % agreement, with the Cohen’s kappa coefficient indicating near-perfect agreement between the coders at 81 % (Landis and Koch, 1977).

4. Results

4.1. Participants’ characteristics

A summary of the participants’ characteristics is presented in Table 1. The sample consisted of 46 % women, with an average age of 46 years. Our post-discussion questionnaire data revealed a predominantly meat-based diet, with 74 % consuming meat at least once a week. Notably, only 14 % of participants had prior experience of eating insect-based food. The questionnaire data also show that the majority of participants (64 %) were willing to try at least one of the IBF options. The varying levels of willingness-to-try among our participants show that our study succeeded in capturing a wide range of opinions from people with differing levels of experience and acceptance of entomophagy.

4.2. Focus-group discussion results

Our qualitative content analysis was based on three main categories: i) attitudes towards the *absence* of FOP insect-labelling; ii) perceived benefits and disadvantages of FOP insect-labelling; and iii) expectations of FOP insect-labelling presentation. Table 2 shows the sub-categories identified for each category and their definitions, as well as the number of FGDs in which each sub-category was discussed, with sub-categories ranked according to this frequency.

In the following sections, we present the original quotes from the discussions, which were translated into English and are cited with the name of the city where the FGD took place and the gender of the participant (F or M).

4.2.1. Attitudes towards the absence of front-of-package insect labelling

Participants evinced mixed responses to pictures of IBF with the presence of insects only indicated on back-of-package ingredients lists.

Negative. Many considered the absence of any indication of insect ingredients on the front of these packages unacceptable, considering it misleading or even “deceptive” despite these contents being included in the ingredients list. In expressing this objection, many emphasised the lack of familiarity among German consumers with entomophagy as an important reason for expecting more prominent insect-labelling on the front of packaging, e.g., “*But at the moment we’re not used to eating insects here, so I think it would be fair to put that on the front so that the consumer has the same information*” (Kassel_F).

² The following two topics were also discussed in the FGDs but not included here as the amount of data generated was too large to present cohesively in a single paper: (i) consumers’ motivations and barriers to eating insect-based food; and (ii) their perceptions of communication materials produced by start-ups selling insect-based food.

³ The participants were informed after the FGDs that the product packaging had been edited for research purposes and that the real product included front-of-package insect labelling.



Fig. 1. Edited pictures of (a) the burger package with an ingredient list showing the presence of ‘mealworm’ (in German, *Mehlwurm*), (b) the protein bar package with an ingredient list showing the presence of ‘cricket powder’ (*Grillenpulver*) and (c) the protein bar package with an ingredient list showing the presence of ‘cricket protein’ (*Grillenprotein*).

Many participants related their expectations about the labelling of IBF with labelling practices for meat, vegetarian and vegan products, e. g., “Vegan products are usually also labelled, like ‘vegan burger’, ‘vegan schnitzel’, or something like that is usually labelled. At least it’s obvious. And [insect-based food] should actually be obvious too, I’d say” (Hamburg_2_M).

The need for FOP insect-labelling was notably more emphasised by participants in the case of products already strongly associated with non-insect-based ingredients (e.g., burgers and their association with beef patty) and products in which insects comprised the main ingredient, e. g., “Yes, but the main ingredient – if the main ingredient is an insect then you have to put the picture of the insects on it the right way” (Dresden_M).

Positive. Participants who did not object or reacted positively to the absence of FOP insect-labelling generally considered it sufficient for the presence of insects to be indicated on the back of packaging in compliance with mandatory labelling requirements. Some pointed out that providing detailed information only on back-of-package ingredient lists was “normal” and that applying this practice to IBF was one way of normalising its consumption:

“Well I wouldn’t think that’s a bad thing now if it’s deliberately supposed to be something normal, because at some point you always started with “there’s tofu in here” or “there are beans in here” and then it disappears and you can leave it out.” (Hamburg_1_M)

The necessity of FOP insect-labelling was also questioned in relation to participants’ views on how much attention consumers pay to back-of-package ingredients lists. For example, some suggested that consumers who do not read ingredients lists “don’t care what they eat” while those who already read such lists do not need more information on the front:

“No, I actually think it’s okay because there are enough people who don’t care what they eat. Then they should just eat it and if they’re really interested then they can read what they’re eating on the back. Nobody looks at what’s in sweets either.” (Munich_2_F)

Ambivalent. In contrast to the clear stance evinced by the majority of participants for or against FOP insect-labelling, some presented arguments that reflected a degree of ambivalence. One participant questioned the argument that FOP insect-labelling is not needed because consumers can always read ingredients lists, arguing that consumers might still feel “cheated”:

“Well, they’re not doing anything wrong – they write it anyway. But you might still feel a bit cheated if you eat it and only read it afterwards. Although yes, you could have read it. So, it’s not a mistake. It’s all correct. But yes... I don’t know.” (Hamburg_2_F)

Another participant, despite being in favour of FOP insect-labelling, further highlighted the impracticality of including all information on the front of packaging, e.g., “Yes, but the question is where does it end? In that case you’d actually have to print the whole back on the front so that you know what’s really in there” (Hamburg_2_F).

4.2.2. Perceived benefits or disadvantages of front-of-package insect-labelling

Benefits. Among the most frequently mentioned benefits of FOP insect-labelling was that it could help address widespread fears among consumers of being “deceived”. This was also mentioned as a benefit for companies producing IBF, with one participant relating clear labelling to the need for firms to protect their reputation:

Table 2

Coding frame with main and sub-categories, their definitions, and the number of focus-group discussions in which each sub-category was discussed (Total = 6).

Coding categories	Definition	FGDs
<i>Attitudes towards absence of front-of-package insect labelling</i>		
Front-of-package labelling is necessary	Statements asserting or explaining why and under which conditions insect ingredients need to be labelled on the front of packaging, and/or why it is insufficient to include this information only in the ingredients list or on back-of-package labelling.	6/6
Back-of-package labelling is sufficient	Statements asserting or explaining why it is sufficient to label the presence of insect ingredients on the ingredients list or on the back of the package.	3/6
Ambivalent attitudes	Statements showing mixed positive/negative attitudes regarding the absence of front-of-package insect labelling.	2/6
<i>Perceived benefits of front-of-package insect labelling</i>		
Enables informed choices	Statements explaining how the presence of front-of-package insect labelling could help shoppers make informed choices (i.e., conscious decisions to buy/not buy based on seeing the label, e.g., due to allergy risks).	5/6
Prevents 'unknowing' consumption and perceived 'deception'	Statements explaining that absence of front-of-package insect labelling may be perceived as 'deception', whereas front-of-package labelling could help prevent consumers' perceiving such deception and unknowingly consuming insects.	4/6
Easy to identify	Statements explaining that the presence of front-of-package insect labelling can help interested consumers identify such products more easily.	4/6
Builds interests in insect-based foods and the brands selling such products	Statements explaining how the presence of front-of-package insect labelling can help build people's interest in insect-based food and the brands or company selling such products.	3/6
<i>Perceived disadvantages of front-of-pack insect labelling</i>		
Reduces attractiveness	Statements on the negative influence of front-of-package insect labelling on product sales and/or consumers' willingness to buy the product.	3/6
Aggravates 'label jungle'	Statements stressing the negative influence of too much front-of-package labelling on consumer trust and perceptions of product quality.	1/6
<i>Expectation of labelling presentation: Legibility and comprehensibility</i>		
Easy to see	Statements on expectations and preferences regarding the legibility/visibility of insect labelling, e.g., size, clarity, position, and ease of recognition.	5/6
Easy to understand	Statements on expectations and preferences regarding the comprehensibility of insect labelling, e.g., language, ease of understanding.	4/6
<i>Expectations of labelling presentation: Format</i>		
Image	Statements on preferences for front-of-package insect labelling in the form of pictures, logos, or symbols, and/or ideas about how such images should look.	5/6
Standardized labelling scheme	Statements on preferences for front-of-package insect labelling in the form of standardized logos, and/or ideas about how such standardized logos should look.	5/6
Textual description	Statements on preferences for front-of-package insect labelling in the form of textual descriptions and/or ideas about how such descriptions should be formulated, e.g., language, use of scientific and/or common terms.	5/6

Table 2 (continued)

Coding categories	Definition	FGDs
<i>Expectation of labelling presentation: Insect protein</i>		
Positive	Statements about the positive influence of the term 'cricket protein' versus 'cricket powder' on consumer perceptions of the product and/or on product appeal.	5/6
Indifferent	Statements indicating no difference in perception regarding the use of 'cricket protein' versus 'cricket powder'.	4/6
Negative	Statements about the negative influence of the term 'cricket protein' versus 'cricket powder' on consumer perceptions of the product and/or on product appeal, e.g., it leads to confusion.	3/6

"My father always told me 'You can do a thousand things properly and no one will ever talk about you, but as soon as you do one thing wrong you're the talk of the town.' And this can also be [true of] a person or a company if two or three [customers] bring [a product] back because they feel deceived." (Dresden_M)

Some participants also pointed out that consumers can only make informed decisions for or against buying IBF if they can quickly and easily identify which products contain insects. Again, many related this need for prominent labelling to their view that shoppers typically do not have time or the habit of inspecting lists of ingredients, e.g., *"It is also much easier for consumers to recognise. Do I want that or not? I'm not standing there for 20 hours"* (Munich_2_F).

Another potential benefit mentioned was that FOP insect-labelling could serve both as an information tool to alert consumers who reject insect-based products and be designed as a marketing tool to appeal to consumers interested in novel foods:

"That would appeal to both those who want to give it a try and those who say 'No, I don't want to eat that'. So that would be a clear thing. It would be fair for both sides – more transparent." (Dresden_M)

Several participants specifically stressed the potential for FOP insect-labelling to stimulate people's interest in IBF and the brands under which it is sold.

Disadvantages. Despite citing many more benefits than disadvantages of FOP insect-labelling, participants nonetheless evinced awareness that it could have detrimental effects. Not least because highlighting the presence of insects could put people off products they might otherwise consider buying or even deter consumers from buying products they previously liked. This risk of reduced product appeal was referred to by one participant, for example, in stating about one product that *"it probably wouldn't sell well if it had a logo like that on it"* (Hamburg_2_M).

Another cited disadvantage of FOP insect-labelling was that adding another label to the existing "label jungle" on the German market could increase consumer scepticism about insect-based products and food-labelling in general:

"And I don't know whether you really have to write that [insect labelling] there [on the front of package] as well. It's debatable. But it's often the case that when it says 'vegan', for example, it's just a marketing gimmick for me – just like 'lactose-free'. The best example is 'lactose-free' cheese. There's never cheese without lactose. It can't be true. So for me it's just marketing." (Munich_2_M)

4.2.3. Expectations about the presentation of front-of-package insect-labelling

When asked about their expectations and preferences for the presentation of FOP insect-labelling, participants referred mainly to

legibility, comprehensibility, and format.

Legibility and comprehensibility. Participants generally emphasised that insect labelling should be easy to notice, though not necessarily large, e.g., “Or you could, for example, ... draw an insect, a small one like this, in the bottom right-hand corner. It doesn’t have to be big” (Dresden_M). Among many arguments advanced in favour of insect-labelling being clearly visible, participants pointed to the difficulty of reading small text, further stressing that labels should be easily recognizable even if not on the front of packaging: “If it’s big enough, it can also be on the back. I don’t want to pull out my magnifying glass every time” (Munich_2_M).

That labels should be easily comprehensible was another criterion strongly emphasised by participants, with many stressing the importance of using common terms for insects and listing ingredients in the official language of the country in which the product is sold and marketed rather than scientific terms and foreign languages:

“I’d like the word ‘insects’ to be clearly written on it – for example ‘Essento Insects Burger’ or ‘Essento Mealworm Burger’ or ‘Protein Cricket Bar’ or something like that. I’d like it in German and not in English, and not abbreviated or distorted.” (Munich_1_F)

Format. When discussing expectations regarding the presentation of FOP insect-labelling, participants most often mentioned images, including symbols, pictures or stamps of insects. Interestingly, some participants with evidently negative attitudes to entomophagy argued that recognizable labels are needed not only to indicate the presence but also the absence of insect ingredients, e.g., “I can label this in the same way as the topic of sugar content ... red, yellow, green. I can also set a green traffic light for cricket-free” (Munich_1_M).

In contrast, some participants expressed a strong preference for positive but informative representations of insects, such as “cute” insect labels to attract more consumers, e.g., “A cute little grasshopper on the front that smiles at you!” (Kassel_M). One participant objected, however, that “funny” depictions of insects on packaging could be seen as patronising by consumers who are averse to eating insects: “I’m not a vegan but I do notice it [cute animal labelling] and I always think it’s as if they’re making fun of us when it’s presented in such a ‘fun’ way” (Kassel_F).

Participants also discussed the possibility of a standardized FOP insect-labelling scheme, with some agreeing that this would be a suitable way of informing consumers about the presence of insect ingredients. The main argument advanced for a uniform type of FOP labelling was that it would increase the recognisability of IBF. In this regard, some participants drew comparisons with the labelling of vegan and vegetarian products:

“There’s also this vegan logo that’s just put at the bottom in the corner and when I see it I know it’s vegan. I can also imagine a logo with a simple ‘I’ for insect or something like that.” (Dresden_F)

Interestingly, some participants stated a preference for FOP insect-labelling in the form of textual description rather than visual illustration, again emphasising that such text should be easy to understand and written in familiar terms and in the national language of target consumers. One argument in favour of text versus visual logos was again referred to the market being saturated with logos, e.g., “I think logos are problematic because they’ve gone overboard with logos and anyone can make their own logo. Just write the word ‘insects’ on it!” (Munich_1_M).

Protein. When asked about their perceptions of the different wording used on labels for the insect-based protein bar shown in Fig. 1 (product b and c), many participants evaluated the product more positively when labelled “cricket protein” rather than “cricket powder”, reflecting positive associations with the current hype surrounding protein. When probed more closely about this preference, some participants suggested that the inclusion of “protein” in labelling could help counteract negative associations with the word “insects”, e.g., “Yes, [if it says freshly processed insects are in the bar] then my head imagines strange things, but if it says ‘protein’, oh well...” (Dresden_F). Some also associated the

consumption of food high in protein with health benefits, while others further suggested that highlighting protein could support the marketing of IBF:

“You have to say protein is ‘in’. Ten years ago, it was only of interest to top athletes, but nowadays many people think everyone has to eat it – that it’s particularly healthy, particularly nutritious, particularly important for their diet. And that’s why I think it has a positive effect.” (Kassel_F)

Here it is important to note that more positive evaluations do not necessarily result in changes in purchasing behaviour. For example, one participant remarked that “As ‘protein’ it sounds a bit better than ‘powder’ but I don’t think I’d buy it either way” (Hamburg_2_M).

Some participants insisted that it was the presence of insects that mattered to them in evaluating the test products, rather than differences in the processing of the insects or any specific wording or images, e.g., “I think the important part at this point is [the presence of] crickets. Whether it’s ‘powder’ or ‘protein’, [what matters is] it’s got crickets in it” (Munich_1_F).

Interestingly, two participants objected to the use of the term “cricket protein” as it could be perceived as misleading or diminishing the sensation of eating insects for those who wish to eat them. For example, one participant said “I’d feel like I was being tricked again – that there’s only ‘protein’ in it. If I eat an insect bar or something insect-like then I want to have that experience” (Dresden_M).

5. Discussion and implications

Our study set out to explore a broad range of German consumers’ expectations and preferences vis-à-vis the use of insect-labelling on the front of packaging. To elicit these perceptions, six focus-group discussions (FGDs) were conducted in four German cities.

5.1. Why front-of-package insect-labelling is important

Our data reveal that differences in the relative importance attributed to FOP insect-labelling by participants in our study were strongly related to individual views on whether shoppers habitually inspect ingredient lists. However, since prior empirical research has confirmed that only a proportion of consumers do in fact read ingredient lists when grocery shopping (BMEL, 2023; Bryla, 2020), we conclude that the arguments in favour of FOP insect-labelling presented below are likely to be relevant for the great majority of consumers.

As noted at the beginning of this study, exploring the issue of FOP insect-labelling is especially salient in view of two ongoing trends: the tendency of producers to apply a “hidden-is-best” strategy of using less visible insect-based ingredients in foods; and the proliferation of “fake news” about consumers being “forced” to eat insects unknowingly. While previous studies have repeatedly confirmed that the “hidden-is-best” strategy is well received by consumers when it comes to the processing of insect-based ingredients (Kröger et al., 2022; Szulc, 2023), our own findings suggest that this strategy may backfire when it comes to the labelling of insect-based food (IBF). For while most of our participants were open to trying IBF, our FGD transcripts reveal that many more arguments were given in favour of FOP insect-labelling than against, including expectations of clear and informative labelling beyond the requirements of the EU’s Novel Food Regulation (EU) 2015/2283.

Crucially, many participants perceived the absence of FOP insect-labelling as “deceptive” even when insect-based contents are clearly stated in ingredient lists. As Wang et al. (2022) have demonstrated in the context of “e-tailing”, such perceptions of perceived “deception” are most likely to occur when there is a gap between consumer expectations and reality. Combined with the results of our own analysis, this suggests that current regulations do not meet consumers’ expectations of the transparency needed to make informed purchasing decisions, even if the factual information now provided on packaging is deemed adequate from a strictly legal perspective (Cervera, 2023a; Weimers, 2023). To

the best of our knowledge, this is the first study to explore consumer perceptions of “deception” related to insect-labelling. Consequently, a key implication of our study is that policymakers and producers should carefully consider consumers’ perspectives whenever developing new labelling policies.

Our findings further underscore the reputational risks for producers and the industry in general of ignoring consumers’ expectations on transparency in insect labelling. Indeed, the damaging consequences of negative word-of-mouth (Coombs, 2007; Wang et al., 2022) and widespread disinformation about IBF can already be observed in Germany (Canetta, 2023). The urgent need to counter such negative perceptions is a key reason why we advocate the voluntary inclusion of FOP insect-labelling on food products. And while we acknowledge that most producers of IBF already apply some form of FOP insect-labelling (Cervera, 2023b), our findings highlight the need for marketers to align their labelling strategies more closely with consumer expectations and preferences in order to harness the full potential of FOP insect-labelling. The importance of consumer-oriented approach is also supported by research on other alternative proteins, such as cultured meat and plant-based foods. For instance, Li et al. (2024) found that Chinese consumers preferred the term “cultured meat” over “artificial meat”, perceiving the former as more beneficial and natural. Similarly, Ruby et al. (2024) reported that US and German consumers associated the “plant-based” label with greater taste, purity and purchase likelihood compared to “vegetarian” and “vegan” labels.

5.2. How to present front-of-package insect-labelling on insect-based food

The implications of our study for the presentation of FOP insect-labelling relate to the dual function of all food labelling as a potentially powerful tool for information and marketing (Stuart, 2010). Regarding the informational function of labels and the need to meet consumer demands for greater transparency, we have shown how participants stressed the need for all labelling to be easily legible and comprehensible. This is a crucial precondition for enabling citizens to make informed choices about whether to eat and/or buy IBF. And while legibility and comprehensibility are already requirements for all food-product labelling under Regulation (EU) No 1169/2011, our findings reveal that consumers also want all voluntary information provided on front-of-package insect labelling to be provided in the official language of the country in which such products are sold and marketed (At present such a language requirement is typically only applied to mandatory food information).

Maximising the marketing potential of FOP insect-labelling is complex, not least because such labelling should ideally attract potential early adopters while also reassuring or even winning over consumers still ambivalent about entomophagy. As our study confirms, this is especially challenging since consumers have strongly contrasting preferences vis-à-vis the presentation of FOP insect-labelling, with some preferring the use of stylized insect images, others strongly insisting on the advantages of a standardized insect-labelling, and others arguing in favour of textual descriptions.

Regarding the use of stylized images, it is important to note that prior research on using “cute” insect images on packaging has reported success in reducing disgust, increasing willingness-to-try, and raising positive expectations (Bruckdorfer and Bütner, 2022; Marquis et al., 2023; Pozharliev et al., 2023). However, our own findings indicate that highly stylized images might not meet consumers’ expectations of transparency, especially among those who use FOP labelling primarily as an information tool. As such, we do not advocate any “one-size-fits-all” approach to formatting FOP insect-labelling but rather reiterate the need for producers to balance marketing and informational functions when designing labels to meet consumer expectations and preferences.

Based on our findings, we underscore the need to adapt the presentation of insect-labelling to the evolving maturity of the industry and market for IBF. When producers are still striving to introduce IBF on the

market, the priority is obviously to *familiarise* consumers with the concept of eating insects. From the perspective of this priority, we can observe mixed results of previous marketing strategies adopted by pioneering producers. For example, while focusing on the marketing of whole insects has proven successful in stimulating curiosity and encouraging adventurous eaters to try this unfamiliar food as a one-off experience, this strategy has not converted such consumers into regular purchasers or significantly expanded the market share of IBF (Fischer, 2021; Schlup and Brunner, 2018).

Accordingly, we align with Fischer (2021) in arguing that the priority in the growth stage should be on making IBF desirable for repeat and daily consumption. Here a relevant finding from our study is that using the term “insect protein” on FOP insect-labelling might both improve product appeal and help counteract negative emotions and “exotic” associations with entomophagy. This is consistent with the findings of Woolf et al. (2019), which demonstrated that individuals who had not previously consumed IBF preferred more refined insect-based ingredients like insect protein isolate. It is worth noting, however, that while our findings reflect current market trends favouring high-protein consumption (Madeiros et al., 2024; Vaccaro et al., 2024), the use of insects in the form of protein concentrates and protein isolates for food fortification is still pending legal approval for placement on the EU market.⁴

All these considerations lead us to advocate a standardized and consumer-oriented FOP insect-labelling scheme as the best means of addressing the expectations highlighted by our study. This proposal is supported by Naranjo-Guevara et al.’s (2023) finding that a standardized insect-certification label, even though new and unfamiliar, can significantly improve consumers’ perceptions of food safety, which is critical for overcoming hesitancy about IBF (Lee and Bae, 2023; Orsi et al., 2019; Tzompa-Sosa et al., 2023). We further propose including customers in co-creating the standard design (Sanders and Stappers, 2008) as an effective way of developing a standardized insect-label that meets consumers’ demands for transparent FOP information and product recognizability while avoiding offending any ambivalent but potential consumers.

Admittedly there are risks associated with adopting a standardized labelling scheme in the long-term. Research on the “V-label” for vegan and vegetarian products (<https://www.v-label.com/>) has shown that standardized labelling can have mixed effects. On the one hand, the scheme has helped make these plant-based products more easily recognizable for consumers consciously striving to reduce their meat consumption. On the other hand, recent research has shown that the label itself can reduce taste expectations and willingness-to-buy among other consumer segments (Berke and Larson, 2023; Stremmel et al., 2022). Another potential drawback, also highlighted in our study, is that introducing a new label risks exacerbating “information overload” among consumers already faced with a “label jungle” (Sonntag et al., 2023).

Notwithstanding these risks, the advantages of a standardized FOP insect-labelling scheme outweigh the drawbacks. And while it may be feasible to discontinue the use of labels for vegetarian and vegan foods now such products have become normalized, the IBF market in Europe is still emerging. Until this market achieves maturity, a standardized scheme is the most effective means of providing consumers with transparency and adequate information. If designed in accordance with consumer expectations, such a scheme should contribute significantly to the normalisation of IBF as a sustainable alternative source of protein.

⁴ Protein concentrate from mealworm (*Tenebrio molitor*) is currently being assessed by the EFSA (2024) following an application to the European Commission in 2020 by *Ynsect* (an organization producing insect-based ingredients).

5.3. Limitations and future research

Two limitations of our study indicate avenues for future research. First, our recruitment criteria did not consider prior experience of eating IBF. This is because our priority was to capture a broad range of perspectives from consumers who are diverse in age, gender, and place of residence, with the intention to also include consumers with varied experiences and levels of acceptance of IBF. Since IBF is currently still a niche market, future research could focus specifically on potential early adopters to attain a better overview of their expectations and thus of how to design labels most effectively for these consumers.

Second, since our focus was on exploring consumers' expectations about which content should be included on FOP insect-labelling and on gaining insights into the reasons underlying their different preferences, we did not set out to gather empirical evidence on which *specific* design might prove most effective for increasing consumer acceptance of IBF. Nevertheless, our findings can inform the development of insect-labelling designs for research investigating consumer opinions of various specific formats. This could be done through qualitative methods such as "think-aloud" protocols to yield in-depth insights into how different kinds of label are perceived by individual consumers.

It is also important to note that our research design was intentionally limited to a small sample size of 50 consumers, as we prioritized in-depth understanding into consumers' perceptions and expectations over generalisable findings. We believe that the findings from our study provide a valuable foundation for building hypotheses on the role of FOP insect-labelling for consumer acceptance and for developing insect-labelling formats that align with consumer demands. These hypotheses and labelling formats can then be tested in future studies using quantitative methods to gain generalisable insights into the most effective way to label insect-based food. Notably, we have already started to explore this research direction in a subsequent study, which employed discrete choice experiments to examine the impact of different insect-labelling on consumer preferences for IBF products (Puteri et al., 2024).

6. Conclusions

By exploring German consumers' preferences and expectations regarding front-of-package (FOP) insect-labelling, our study has revealed a significant gap between consumer expectations and the current regulation of insect-based food (IBF) labelling. Addressing this discrepancy is crucial to help overcome the spread of disinformation about consumers being "deceived" into unknowingly eating "hidden" insect-based ingredients due to the absence of prominent FOP insect-labelling. Our insights contribute to theory and practice in guiding efforts to tackle this challenge, including three recommendations to guide marketers in how best to label IBF products intended for daily consumption.

First, in order to minimize consumer perceptions of deception, the presence of insect ingredients must always be clearly indicated on the front of food packaging even when not legally required. Second, to avoid confusion, insect descriptions on packaging must always use familiar terms and be written in the official language(s) of the country of marketing. Third, to ensure IBF products are easily recognised by target consumer segments and do not evoke negative emotions among ambivalent consumers, we propose the development of a consumer-oriented and standardized FOP insect-labelling scheme carefully designed to meet consumer expectations of transparency and harness the potential of FOP labelling as both a marketing and information tool.

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Ethical statement

The study was ethically approved by the Central Ethics Committee of the University of Kassel (zEK-42). The participants were informed of the strict protection of their anonymity and their freedom to withdraw from the discussion at any time. The study was explained to the participants prior to the focus-group discussions. The participants gave their written informed consent to participate in this study before the discussions began and received financial compensation.

Data availability

The data that support the findings of this study are available on request from the corresponding author.

Supplementary material

The supplementary material for this study can be found online in OSF at <https://doi.org/10.17605/OSF.IO/E8CQR>.

CRediT authorship contribution statement

Berlianti Puteri: Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Benedikt Jahnke:** Writing – review & editing, Supervision, Project administration, Methodology, Investigation, Funding acquisition, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Supplementary materials

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References

- Alhujaili, A., Nocella, G., Macready, A., 2023. Insects as food: consumers' acceptance and marketing. *Foods* 12, 886. <https://doi.org/10.3390/foods12040886>.
- Baker, M.A., Shin, J.T., Kim, Y.W., 2016. An exploration and investigation of edible insect consumption: the impacts of image and description on risk perceptions and purchase intent. *Psychol. Mark.* 33 (2), 94–112. <https://doi.org/10.1002/mar.20847>.
- Bashi, Z., McCullough, R., Ong, L., Ramirez, M., 2019. Alternative Proteins: The Race For Market Share Is On. McKinsey & Company: Our Insights. <https://www.mckinsey.com/industries/agriculture/our-insights/alternative-proteins-the-race-for-market-share-is-on>. accessed 15 March 2024.
- Berke, A., Larson, K., 2023. The negative impact of vegetarian and vegan labels: results from randomized controlled experiments with US consumers. *Appetite* 188, 106767. <https://doi.org/10.1016/j.appet.2023.106767>.
- BMEL, 2023. Deutschland, wie es isst: der BMEL-Ernährungsreport 2023. https://www.bmel.de/SharedDocs/Downloads/DE/Broschueren/ernaehrungsreport-2023.pdf?__blob=publicationFile&v=4 accessed 07 March 2024.
- Bruckdorfer, R.E., Büttner, O.B., 2022. When creepy crawlies are cute as bugs: investigating the effects of (cute) packaging design in the context of edible insects. *Food Qual. Prefer.* 100, 104597. <https://doi.org/10.1016/j.foodqual.2022.104597>.
- Bryla, P., 2020. Who reads food labels? Selected predictors of consumer interest in front-of-package and back-of-package labels during and after the purchase. *Nutr* 12 (9), 2605. <https://doi.org/10.3390/nu12092605>.

- Canetta, T., 2023. EU With A Side Of Insects: A Delicious Treat For Disinformers. European Digital Media Observatory. <https://edmo.eu/publications/eu-with-a-side-of-insects-a-delicious-treat-for-disinformers/>. accessed 01 July 2024.
- Cervera, M., 2023a. Consumers Are “well informed” About Insect-Based foods, Says European Commission. Food Ingredients First. <https://www.foodingredientsfirst.com/news/consumers-are-well-informed-about-insect-based-foods-says-european-commission.html>. accessed 04 July 2024.
- Cervera, M., 2023b. Insect Protein Consortium Urges Producers to Rethink On-Pack Branding Amid Macroeconomic Issues. Food Ingredients First. <https://www.foodingredientsfirst.com/news/insect-protein-consortium-urges-producers-to-rethink-on-pack-branding-amid-macroeconomic-issues.html>. accessed 02 November 2023.
- Coombs, W., 2007. Protecting organization reputations during a crisis: the development and application of Situational Crisis Communication Theory. *Corp. Reput. Rev.* 10, 163–176. <https://doi.org/10.1057/palgrave.crr.1550049>.
- Daub, C.H., Gerhard, C., 2022. Essento insect food AG: how edible insects evolved from an infringement into a sustainable business model. *Int. J. Entrep. Innov.* 23 (4), 280–290. <https://doi.org/10.1177/14657503211030802>.
- EFSA, 2024. Novel Food Application. EFSA Open. <https://open.efsa.europa.eu/questions/EFSA-Q-2021-00105>. accessed 01 July 2024.
- European Newsroom, 2023. Misinformation swirls over EU edible insects. <https://eur.opennewsroom.com/misinformation-swirls-over-eu-edible-insects/> accessed 17 July 2024.
- Fischer, A., 2021. Eating insects – from acceptable to desirable consumer products. *J. Insects Food Feed* 7 (7), 1061–1063. <https://doi.org/10.3920/JIFF2021.x008>.
- Goncikowska, K., Modlinska, K., Adamczyk, D., Altuntaş, U.C., Maison, D., Pisula, W., 2023. The influence of various information about insect content and its advantages on the acceptance of foods containing insects. *J. Food Prod. Mark.* 29 (2–3), 82–99. <https://doi.org/10.1080/10454446.2023.2206364>.
- International Platform of Insects for Food and Feed, 2019. Guidance: the provision of food information to consumers – Edible insect-based products. <https://ipiff.org/wp-content/uploads/2019/09/FIC-doc.pdf> accessed 17 July 2024.
- Kröger, T., Dupont, J., Büsing, L., Fiebelkorn, F., 2022. Acceptance of insect-based food products in Western societies: a systematic review. *Front. Nutr.* 8, 759885. <https://doi.org/10.3389/fnut.2021.759885>.
- Kuckartz, U., 2019. Qualitative text analysis: a systematic approach. In: Kaiser, G., Presmeg, N. (Eds.), *Compendium For Early Career Researchers in Mathematics Education*. Springer Nature, pp. 181–196.
- Landis, J.R., Koch, G.G., 1977. The measurement of observer agreement for categorical data. *Biom* 33 (1), 159–174. <https://doi.org/10.2307/2529310>.
- Lange, K.W., Nakamura, Y., 2023. Potential contribution of edible insects to sustainable consumption and production. *Front. Sustain.* 4, 1112950. <https://doi.org/10.3389/frsus.2023.1112950>.
- Ledesma-Chaves, P., Gil-Cordero, E., Maldonado-López, B., 2024. Consumer behavioural factors of the new EU regulatory framework for the feeding of insect-derived products. *Fut. Foods* 9, 100383. <https://doi.org/10.1016/j.fufo.2024.100383>.
- Lee, J., Bae, S.J., 2023. Attributes of insect food acceptance: identifying key factors with consumer market segmentation. *Int. J. Gastron. Food Sci.* 32, 100702. <https://doi.org/10.1016/j.ijgfs.2023.100702>.
- Li, H., van Loo, E.J., Bai, J., van Trijp, H.C.M., 2024. Understanding consumer attitude toward the name framings of cultured meat: evidence from China. *Appetite* 195, 107240. <https://doi.org/10.1016/j.appet.2024.107240>.
- Madeiras, F., Aleman, R.S., Gabríny, L., You, S.W., Hoskin, R.T., Moncada, M., 2024. Current status and economic prospects of alternative protein sources for the food industry. *Appl. Sci.* 14, 3733. <https://doi.org/10.3390/app14093733>.
- Marquis, D., Oliveira, D., Pantin-Sohier, G., Reinoso-Carvalho, F., Deliza, R., Gallen, C., 2023. The taste of cuteness: how claims and cute visuals affect consumers' perception of insect-based foods. *Int. J. Gastron. Food Sci.* 32, 100722. <https://doi.org/10.1016/j.ijgfs.2023.100722>.
- Modlinska, K., Adamczyk, D., Goncikowska, K., Maison, D., Pisula, W., 2020. The effect of labelling and visual properties on the acceptance of foods containing insects. *Nutr* 12 (9), 2498. <https://doi.org/10.3390/nu12092498>.
- Naranjo-Guevara, N., Stroh, B., Floto-Stammen, S., 2023. Packaging communication as a tool to reduce disgust with insect-based foods: effect of informative and visual elements. *Foods* 12, 3606. <https://doi.org/10.3390/foods12193606>.
- Nowakowski, A.C., Miller, A.C., Miller, M.E., Xiao, H., Wu, X., 2022. Potential health benefits of edible insects. *Crit. Rev. Food Sci. Nutr.* 62 (13), 3499–3508. <https://doi.org/10.1080/10408398.2020.1867053>.
- O'Connor, C., Joffe, H., 2020. Inter-coder reliability in qualitative research: debates and practical guidelines. *Int. J. Qual. Methods* 19, 1–13. <https://doi.org/10.1177/1609406919899220>.
- Orsi, L., Voegelé, L.L., Stranieri, S., 2019. Eating edible insects as sustainable food? Exploring the determinants of consumer acceptance in Germany. *Food Res. Int.* 125, 108573. <https://doi.org/10.1016/j.foodres.2019.108573>.
- Pozharliev, R., De Angelis, M., Rossi, D., Bagozzi, R., Amatulli, C., 2023. I might try it: marketing actions to reduce consumer disgust toward insect-based food. *J. Retail.* 99 (1), 149–167. <https://doi.org/10.1016/j.jretai.2022.12.003>.
- Puteri, B., Jahnke, B., Zander, K., 2023. Booming the bugs: how can marketing help increase consumer acceptance of insect-based food in Western countries? *Appetite* 187, 106594. <https://doi.org/10.1016/j.appet.2023.106594>.
- Puteri, B., Oehlmann, M., Jahnke, B., 2024. Who has an appetite for insects? Identifying segments of early adopters of insect-based food and their product attribute preferences: insights from a choice experiment study in Germany. *Food Res. Int.* 196, 114994. <https://doi.org/10.1016/j.foodres.2024.114994>.
- Ruby, M.B., Graça, J., Olli, E., 2024. Vegetarian, vegan, or plant-based? Comparing how different labels influence consumer evaluations of plant-based foods. *Appetite* 197, 107288. <https://doi.org/10.1016/j.appet.2024.107288>.
- Sanders, E.B.N., Stappers, P.J., 2008. Co-creation and the new landscapes of design. *CoDesign* 4 (1), 5–18. <https://doi.org/10.1080/15710880701875068>.
- Schlup, Y., Brunner, T., 2018. Prospects for insects as food in Switzerland: a tobit regression. *Food Qual. Prefer.* 64, 37–46. <https://doi.org/10.1016/j.foodqual.2017.10.010>.
- Sonntag, W.I., Lemken, D., Spiller, A., Schulze, M., 2023. Welcome to the (label) jungle? Analyzing how consumers deal with intra-sustainability label trade-offs on food. *Food Qual. Prefer.* 104, 104746. <https://doi.org/10.1016/j.foodqual.2022.104746>.
- Stremmel, G., Elshiewy, O., Boztug, Y., Carneiro-Otto, F., 2022. Vegan labeling for what is already vegan: product perceptions and consumption intentions. *Appetite* 175, 106048. <https://doi.org/10.1016/j.appet.2022.106048>.
- Stuart, S.A., 2010. The relationship between mandatory and other food label information. *Br. Food J.* 112 (1), 21–31. <https://doi.org/10.1108/00070701011011173>.
- Szulc, K., 2023. Edible Insects: a study of the availability of insect-based food in Poland. *Sustain* 15, 14964. <https://doi.org/10.3390/su152014964>.
- Tzompa-Sosa, D.A., Sogari, G., Copelotti, E., Andreani, G., Schouteten, J.J., Moruzzo, R., Liu, A., Li, J., Mancini, S., 2023. What motivates consumers to accept whole and processed mealworms in their diets? A five-country study. *Fut. Foods* 7, 100225. <https://doi.org/10.1016/j.fufo.2023.100225>.
- Vaccaro, C.M., Guarino, G., Danza, F., Fraulino, A., Bracale, R., 2024. Changing food choices: the option for high-protein foods and the move away from the Mediterranean diet. *Eat. Weight Disord. – Stud. Anorexia Bulimia Obes.* 29 (39). <https://doi.org/10.1007/s40519-024-01668-2>.
- van Huis, A., Rumpold, B., 2023. Strategies to convince consumers to eat insects? A review. *Food Qual. Prefer.* 110, 104927. <https://doi.org/10.1016/j.foodqual.2023.104927>.
- VERBI Software, 2021. MAXQDA 2022 [computer software]. VERBI Software, Berlin. Available from. maxqda.com.
- Wang, X., Ashraf, A.R., Thongpapanl, N., Wang, K.Y., 2022. Perceived deception and online repurchase intention: the moderating effect of product type and consumer regulatory orientation. *J. Consum. Behav.* 21 (4), 1522–1539. <https://doi.org/10.1002/cb.2109>.
- Weimers, C., 2023. Parliamentary Question - E-000581/2023: Insects in Food. European Parliament. https://www.europarl.europa.eu/doceo/document/E-9-2023-000581_EN.html. accessed 04 July 2024.
- Woolf, E., Zhu, Y., Emory, K., Zhao, J., Liu, C., 2019. Willingness to consume insect-containing foods: a survey in the United States. *LWT* 102, 100–105. <https://doi.org/10.1016/j.lwt.2018.12.010>.