GALVANIC SKIN RESPONSE AND SURVEY DATA IN INSECT-BASED FOOD ADVERTISING RESEARCH: INSIGHTS FOR SUSTAINABLE FOOD MARKETING

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ABSTRACT

Advertising influences consumers' food choices and eating behaviours. A claim for reducing meat consumption and for complementing nutritional needs with protein alternatives has been raised in recent years. Insects are reported in the literature to offer environmental, economic, social, and nutritional benefits for human consumption. However, when consumers are aware of this new alternative and its benefits, they identify themselves as not convinced. Few studies in insect-based food research have paid attention to advertising as a strategy to increase the likelihood of consuming these products. To address this gap, our research aims to identify how the benefits insect-based foods offer can be used to enhance the consumption of this novel food. A two-stage data collection experiment was conducted: galvanic skin response (GSR) recording during insect-based food video advertising visualisation; and insect-based food video advertising visualisation followed by a survey, in which participants self-reported emotions and identified the benefits they most valued when considering whether to consume or not to consume insect-based food. The results indicate that advertising significantly increases the likelihood of future consumption. The research offers an essential contribution to sustainable insect-based food marketing with practical applications.

Keywords: edible insects, consumer neuroscience, galvanic skin response, self-reported emotions

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1. Introduction

Food advertising has always had the power to influence eating behaviours and consumers' food choices (Harris et al., 2009; Verbeke, 2008; Vukmirovic, 2015). Throughout the years, we have been receiving warnings through this channel to make better food choices, especially to reduce meat consumption, as protein consumption habits need to change. Meat consumption is nowadays considered unsustainable and, due to a growing demand, will in the future have more obvious repercussions on the environment (Videbæk & Grunert, 2020). In addition, research relying on the overconsumption of red and processed meat identified adverse health outcomes (Ellithorpe et al., 2022). For these reasons, the food industry has been investing in identifying new alternatives to animal meat.

Nutritionally rich (digestible protein), sustainable, and offering economic and social benefits, insects emerged in the last decade as an alternative to satisfy demand for protein in a growing world population (Adamczyk et al., 2023; Cicatiello et al., 2020; van Huis & Rumpold, 2023). However, despite its potential, Europeans are not aware of this alternative, and when they are, they remain reluctant to the benefits that insects as food can offer (Gere et al., 2017).

Informative advertising campaigns can raise awareness and communicate the benefits (economic, social, environmental, and nutritional) of insect-based foods, thereby promoting their consumption (Pozharliev et al., 2023; Vizcaíno & Pohlmann, 2025).

Previous literature on food advertising includes Berger et al. (2018), who examined the efficacy of utilitarian discourse in enhancing insect-based food consumption, and Meng and Fan (2024), who used message framing (loss frame/gain frame) to influence consumer behaviour. Also, Puteri et al. (2023) found that influencers play a role in improving perceptions of the quality of insect-based foods. Regarding the communication of the benefits of specific food categories, Martey (2025) researched to identify the impact of emphasising the health and environmental benefits of green food on purchase intention (Martey, 2025).

As shown, the impact of communicating the benefits of insect-based foods on their potential consumption remains understudied.

This research will address this gap, aiming to identify how the benefits insect-based foods offer can be used to enhance their consumption. The research question: "How can the benefits of insect-based food be used as a strategy to increase the acceptance of this novel food?" and the following specific research objectives guided the research: (i) to identify how European consumers physically react to insect-based food's video advertising stimuli; (ii) to identify which insect-based food benefit for human consumption is more valued by Europeans; (iii) to identify the impact of the usage of product and user on the likelihood future consumption (iv) to identify the emotions triggered during insect-based food advertising visualisation. A two-stage data collection experiment was conducted: GSR recording during insect based food video advertising visualisation (2x2 between-subjects design, manipulating two factors on video advertising: message appeal - emotional vs. rational and advertising focus - product vs. human), and insect-based food video advertising visualisation followed by a survey self-reporting emotions and identifying the benefits that most impact their choice to consume insect-based food. We built our research on the Model of Goal Directed Behavior, that identifies the role of emotions as a predictor of intention (Perugini & Bagozzi, 2001), the Elaboration Likelihood Model of Persuasion (Petty & Cacioppo, 1986) that clarify how persuasive messages have an explanatory power on attitudes and Media Richness Theory (Daft & Lengel, 1986) that reinforces the role of media to increase the value of messages and its communication. The research offers an essential contribution to the field of food marketing for insect based foods: it addresses a gap in the literature by identifying the impact of communicating the benefits of consuming insect-based food for humans through advertising, depending on message appeal and the advertising focus. It is addressed using consumer neuroscience tools

and emotion self-reports, providing practical guidance for advertisers and marketers on promoting this and other sustainable protein alternatives to animal meat.

2. Methods

A two-stage data collection was conducted: first, a laboratory-based neuromarketing experiment was led using a 2x2 between-subjects design, manipulating two factors on video advertising: message appeal (emotional vs. rational) and advertising focus (product vs. human). Figures 1-4 show the images used for the two factors. A total of eight video advertisements were created – four included both text and voice-over, while the other four were comparable versions without text.


***Figures 1 and 2**. Message appeal (emotional vs. rational) video advertising frames*


***Figures 3 and 4.** Advertising focus (product vs. human) video advertising frames*

Twenty-nine participants (n=29) from across Europe viewed a 15-second advertisement introducing the idea of insects as an alternative food source and highlighting their benefits (environmental, economic and social, nutritional) for human consumption. During exposure, GSR was recorded using the Shimmer 237E sensor (Burns et al., 2010).

This neuroscience tool, GSR, measures galvanic skin response (skin electrical activity) resulting from sweat glands when exposed to marketing stimuli (Lao et al., 2012; Potter & Bolls, 2012; Venkatraman et al., 2015). The analysis of peaks — modifications in phasic activity above tonic activity — provides information about participants' emotional arousal (Boucsein, 2012).

A laboratory second study was designed and applied to 172 participants (n=172): it started with a brief survey asking about the likelihood of future consumption of insect-based foods, followed by a video advertisement (the same videos as in study 1). After that, participants completed a survey: self-reporting their emotions on a 7-point Likert scale; identifying which of the benefits mentioned in the video had greater power to influence their likelihood of future consumption; and, again, a future consumption perspective for comparative purposes.

3. Results

4.1. Study one: Galvanic Skin Response

GSR analysis (Table 1) offers important insights for the research. Product frames elicit higher peak counts and peaks/minute, indicating high levels of emotional arousal, especially when combining rational message appeals with an advertising focus on the product.

Table 1. Peak count, peaks per minute and peak amplitude mean values per stimulus

Stimuli	Peak Count	Peaks Per Minute	Peak Amplitude
vd.EP	2,00	6,27	0,05

vd.EP-stx 2,50 7,59 0,03

vd.EU 1,60 5,30 0,09

vd.EU-stx 2,50 8,28 0,07

vd.RP 3,50 10,94 0,09

vd.RP-stx 2,20 6,88 0,07

vd.RU 2,75 9,56 0,08

vd.RU-stx 1,67 5,80 0,03

vd video; EP emotional-product; EU emotional-human.
RP rational-product; RU rational-human; -stx without text

Also, videos without text showed a smaller number of peaks than videos with text. A higher need for attention may explain this.

4.2. Study two: Survey

The survey analysis relies on identifying which benefits participants value more when considering trying or consuming insect-based food (Table 2); comparing the likelihood of future consumption before and after video advertising visualisation (Table 3); and finally, the self-report of emotions (Table 4).

Table 2. *Summary of benefits' preference versus stimuli*

	Benefits	
Stimuli	**Environmental**	**Economic and social**	**Nutritional**
EP	8	1	12
EPstx	6	2	13
EU	10	3	8
EUstx	6	4	11
RP	10	1	11
RPstx	8	1	12
RU	4	3	15
RUstx	6	2	13
Total benefits	58	17	95

Participants reported that the nutritional and environmental benefits of consuming insect-based food are most valued and most likely to influence future consumption. No significant differences were found between message appeal or between advertising focus.

Table 3. Before versus after video visualisations' likelihood for future consumption

scale	**before video**	**after video**
1- Impossible	33	25
2- Unlikely	33	21
3 - Less than even chance	41	28
4 - I do not know	10	14
5 - More than even chance	30	35
6 - Likely	16	32

7 - Certainly 7 15

A comparison between the likelihood of future consumption before and after video visualisation allows us to conclude that, after visualisation of video advertising introducing insect-based food, participants elicit higher levels of likelihood of future consumption (from 32% to 48%), indicating that advertising videos are effective at enhancing the acceptance of insects as food.

Table 4. Emotional reporting (mean values) per stimulus

Stimuli Fear Surprise Sadness Disgust Angry Neutral Happiness EP 3,6 4,2 4,4 4,7 2,7 3,8 2,0 **EPstx** 4,1 3,7 4,6 4,2 3,4 4,5 2,2 **EU** 3,2 3,7 4,1 3,9 3,4 3,4 1,8 **EUstx** 3,8 3,9 3,7 4,5 2,9 3,9 2,1 **RP** 2,8 3,8 3,1 4,5 2,5 3,9 2,4 **RPstx** 3,0 4,1 2,7 4,4 2,4 3,6 3,0 **RU** 3,1 4,1 2,5 4,2 2,6 4,1 2,6 **RUstx** 2,9 3,9 2,9 4,5 2,0 4,2 2,3 **Mean/stimuli** 3,3 3,9 3,5 4,4 2,7 3,9 2,3

Emotional self-report indicated that participants consciously felt disgust, surprise, and fear. Also, they enhanced contempt (neutral). These results are in accordance with the previous findings of Ferreira et al. (2024) and Gumussoy and Rogers (2023).

4. Conclusions, limitations and future research avenues

This research aimed to identify how the benefits of insect-based foods should be communicated and incorporated into marketing strategies to enhance their consumption. It found that product frames in advertising provoke higher levels of emotional arousal, especially when insect benefits are presented with a rational appeal. Furthermore, environmental and nutritional claims most influence the likelihood of future consumption. Most importantly, we identified a significant impact of advertising on the likelihood of future consumption. Practical and managerial implications are identified: advertising is effective in promoting insect-based food. To marketeers and communication specialists, it is recommended to communicate the benefits of insect-based food, enhancing rational, nutritional, and environmental claims targeted to health and environmentally conscious customers. Overall, the research provides insights for sustainable food marketing; several limitations are acknowledged. The sample size of the first study (n=27) is small. Future research is recommended with bigger samples to get more reliable conclusions.

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