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Short Communication

## Rescue us all! the effects of the “rescued” claim for familiar and unfamiliar food ingredients

Fernanda Silveira Carneiro<sup>a,\*</sup>, Steffen Jahn<sup>b</sup>, Jessica Aschemann-Witzel<sup>c</sup>, Yasemin Boztug<sup>a</sup><sup>a</sup> Department of Business Administration, University of Goettingen, 37073 Goettingen, Germany<sup>b</sup> School of Economics and Business, Martin Luther University Halle-Wittenberg, 06108 Halle, Germany<sup>c</sup> MAPP Centre, Department of Management, Aarhus University, Aarhus, Denmark

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## ABSTRACT

The United Nations has committed to halving food waste by 2030. In line with this goal, companies have started rescuing some foods that would otherwise be discarded and communicating it to their customers. These foods are repurposed as ingredients and marketed as upcycled or rescued. Notably, upcycled products (e.g., ice cream) can be made with rescued ingredients that are familiar (e.g., chocolate) or unfamiliar (e.g., malted milk) to consumers, which might affect how they are perceived. This research aims to investigate the impact of informing consumers about the “rescued” nature of ingredients. It also assesses how consumers’ familiarity with these rescued ingredients moderates the effect on product perception and consumer behavior. We find that adding a “rescued” claim enhances a product’s perceived sustainability and healthiness, positively influencing consumers’ purchase intention. No significant effect of the claim on expected taste was observed. The effects of the claim on perceived sustainability and healthiness are more pronounced when consumers are already familiar with the rescued ingredient.

### 1. Introduction

Around 30 % of all food produced ends up wasted (UNEP (United Nations Environment Programme), 2021). Overproduction, aesthetic flaws, and underuse of potential are among the main reasons this occurs. While the disclosure of whether an ingredient has been rescued from waste is not mandatory, some companies have begun to do so, aiming to draw attention to the food waste problem and signal social responsibility. However, even though consumers are concerned about food waste, the degree of consumer acceptance of upcycled foods is a subject of debate. While previous research has focused on the personal characteristics that lead to the acceptance of upcycled foods (e.g., Coderoni & Perito, 2021; de Hooge, 2025), or on how different ways of communicating about the upcycled characteristic affects product acceptance (e.g., de Hooge, 2025), we have limited understanding of the mechanism underlying acceptance of upcycled food, including boundary conditions. For example, some studies suggest that consumers have positive attitudes toward the upcycled food category in general, akin to their views on other forms of corporate social responsibility (CSR) and pro-environmental products. Yet other studies have reported backfire effects as consumers may associate the rescued characteristic with

spoiled food (for a review, see Lu et al., 2024). Therefore, our research objective is to integrate prior theorizing to examine how and when a “rescued” claim affects product perceptions and, subsequently, consumer behavior. The less a food visually reminds consumers of its rejected background, the higher the likelihood of acceptance (de Hooge et al., 2017). Based on this, we focused on studies on processed foods where the upcycled characteristic is not visually perceived. To address this research objective, we discuss important inference mechanisms resulting from the “rescued” claim for three important drivers of food purchase intentions, namely perceived sustainability, healthiness, and taste. Further, we consider the moderating role of familiarity with the rescued ingredient (Grasso & Asioli, 2020).

The significance of sustainability attributes in food choices has increased in the last few years (Smeding et al., 2023). Past research reveals consumer interest in purchasing upcycled foods made with ingredients that would otherwise be discarded (Zhang et al., 2020), with environmental reasons being a motivation for their acceptance (Coderoni & Perito, 2021; Nitzko & Spiller, 2019). Consumers perceive the use of ingredients that would otherwise go to waste as environmentally friendly (Grasso et al., 2023). However, some people may not perceive upcycled foods as sustainable (Zhang et al., 2020). This might

\* Corresponding author.

E-mail address: [fernanda\\_carneiro-otto@uni-goettingen.de](mailto:fernanda_carneiro-otto@uni-goettingen.de) (F.S. Carneiro).<https://doi.org/10.1016/j.foodqual.2025.105462>

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be due to concerns about the origin of the rescued ingredients since long transportation distances would mean higher greenhouse emissions, or the belief that the rescued ingredients should have been donated to charity instead of being further processed into upcycled food. Based on past research, it remains unclear whether informing individuals that a product contains rescued ingredients will have an impact on its perceived sustainability. When shopping for food, consumers often rely on cues to evaluate products and make decisions. We believe that it is unlikely that the presence of the “rescued” claim will prompt consumers to reflect deeply on various aspects of the product’s sustainability. Therefore, we hypothesize that the “rescued” claim (vs. no claim) increases sustainability perception of the upcycled product (H1).

Health is another crucial factor guiding food decisions. Consumers often associate what is beneficial for the environment and society as also advantageous to themselves (Schuldt et al., 2012). Since upcycled foods are perceived as beneficial for the environment (Grasso et al., 2023), a “rescued” claim might spill over into perceptions of increased healthiness. Yet, food waste is not typically associated with a nutritional source, and consumers sometimes perceive upcycled food as less fresh (de Visser-Amundson et al., 2021). This might be one of the reasons why they do not associate upcycled foods with health benefits (Coderoni & Perito, 2021). Even though rescued ingredients may have the same nutritional value as regular ones, consumers might believe that the reutilization process has reduced their nutritional value (Prada et al., 2021), potentially lowering the perceived healthiness of foods with the “rescued” claim. Accordingly, we argue that the “rescued” claim (vs. no claim) decreases the perceived healthiness of the upcycled product (H2).

Taste is a crucial characteristic consumers evaluate when considering a food product (Smeding et al., 2023). Claims highlighting sensory aspects of the food, such as their freshness (Piqueras-Fiszman & Spence, 2015), have been found to positively affect expected taste. However, when consumers believe that the advertised attributes diminish product quality, the claim may backfire. For instance, products with a vegan label may be perceived as tasting worse than those made with animal-derived ingredients (Stremmel et al., 2022), possibly due to consumers associating vegan products with a different sensory experience than the one appreciated by those consumers (e.g., not being as creamy as a product containing milk). This can even lead to reduced taste expectations for naturally vegan products if a “vegan” label is provided (Stremmel et al., 2022). Upcycled foods are made with ingredients that were previously discarded, potentially prompting consumers to associate these foods with old products or waste (de Visser-Amundson et al., 2021). Highlighting this characteristic might result in consumers perceiving the food as having lower value (Aschemann-Witzel & Stangherlin, 2021), thus negatively affecting the taste expectation of upcycled products. Consequently, we argue that the presence of a “rescued” claim (vs. no claim) will reduce an upcycled food’s expected taste (H3). Food labeling research has repeatedly shown that perceived sustainability, healthiness, and taste influence purchase intention (Grasso et al., 2023; Zhang et al., 2020). Consequently, we expect these variables to mediate the effects of the “rescued” claim (vs. no claim) on purchase intention (H4a-c).

We now turn to an important boundary condition of the mentioned inference mechanisms, familiarity with the rescued ingredient. Upcycled foods can be made with ingredients that consumers are familiar with (e.g., chocolate), but also from those they are unfamiliar with (e.g., malted milk). Previous research has shown that upcycled foods made with a familiar ingredient were rated more favorably than those made with an unfamiliar one (Aschemann-Witzel & Stangherlin, 2021; Grasso & Ascoli, 2020). We therefore argue that informing consumers about a familiar rescued ingredient will amplify the positive effect of the “rescued” claim on perceived sustainability (H5a); and it will attenuate the negative effect on perceived healthiness (H5b) and taste (H5c).

## 2. Materials and methods

### 2.1. Participants

We recruited 236 participants in Germany who were fluent in German via Prolific. We excluded responses from participants who took the survey more than once ( $N = 6$ ) (participation with identical IP Address) or failed the attention check ( $N = 15$ ). Due to our ice cream stimuli, we also excluded participants who declared that they do not consume dairy products ( $N = 12$ ) to avoid biased answers. We had 203 valid responses that remained and were used for data analysis. The average age of the sample was 29.06 years ( $SD = 8.58$ ,  $min = 18$   $max = 65$ ), with 48.3 % women and 1 % non-binary/preferred not to answer, 51.3 % had at least a bachelor’s degree. Our study received ethical approval (nr. 78./09.23) from the university’s independent review board.

### 2.2. Stimuli

In selecting our stimuli, we aimed to choose commonly known food products that could be made with both familiar and unfamiliar ingredients. The objective of varying only the rescued ingredient was to ensure that any observed effects were due to the ingredient’s familiarity rather than the familiarity with the product per se. Our stimuli were chocolate and malted milk ice cream. Chocolate is wasted for many reasons, including its appearance and unsold seasonal products. While malted milk is not typically wasted, it is derived from spent malted barley - a by-product of beer production that is regularly removed from the human food supply chain. This connection allows products containing malted milk to be plausibly advertised as incorporating “rescued” ingredients. A pre-study ( $N = 40$ , Prolific, 55.0 % women,  $M_{age} = 29.75$ ,  $SD = 8.16$ ; 52.5 % with at least a bachelor’s degree, 1 = “very unfamiliar” to 7 = “very familiar”) revealed that chocolate was perceived as a familiar ingredient ( $M = 6.28$ ,  $SD = 1.38$ ,  $t(39) = 10.45$ ,  $p < 0.001$ ,  $d = 1.38$ ) and malted milk as unfamiliar ( $M = 1.90$ ,  $SD = 1.55$ ,  $t(39) = -8.57$ ,  $p < 0.001$ ,  $d = 1.55$ ).

### 2.3. Procedure

We used a 2 (claim: no claim vs. “rescued” claim) x 2 (ingredient familiarity: unfamiliar vs. familiar) between-subjects design to test our hypotheses. The participants were randomly assigned to one of four experimental conditions. Those assigned to the “rescued” claim condition first read a short description (“Rescued foods are made from ingredients that would otherwise go to waste. This often happens due to aesthetic flaws, oversupply, or underestimated potential uses.”) before being asked to rate the displayed product. Participants in the “no claim” condition skipped this part. This procedure follows previous literature (de Visser-Amundson et al., 2021; Zhang et al., 2020), and it is relevant since the “rescued” claim is relatively new in the market and unfamiliar to most people.

Participants were then asked to evaluate the product presented (“Compared to other ice creams, I think the ice cream pictured above is...”) in terms of perceived sustainability (1 = not sustainable at all, 7 = very sustainable), perceived healthiness (1 = not healthy at all, 7 = very healthy), expected taste (1 = not tasty at all, 7 = very tasty) and state their intention to purchase the ice cream (“Compared to other ice creams, I would ... 1 = definitely not buy, 7 = definitely buy... the ice cream pictured above).

## 3. Results

ANOVA results indicate that perceived sustainability was higher for products with the “rescued” claim ( $M_{noclaim} = 3.58$  vs.  $M_{claim} = 5.66$ ,  $F(1, 199) = 169.56$ ,  $p < 0.001$ ), as was perceived healthiness ( $M_{noclaim} = 3.26$  vs.  $M_{claim} = 3.95$ ,  $F(1, 199) = 18.71$ ,  $p < 0.001$ ). While the

increased sustainability perception supports H1, the claim did not reduce perceived healthiness, leading to the rejection of H2. The “rescued” claim did not affect expected taste ( $M_{\text{noclaim}} = 3.77$  vs.  $M_{\text{claim}} = 3.79$ ,  $F(1, 199) = 0.02$ ,  $p = 0.881$ ), consequently leading us to reject H3.

To test the indirect effect of the “rescued” claim on purchase intention via (a) perceived sustainability, (b) healthiness, and (c) taste, we used the PROCESS macro for SPSS (model 4; Hayes, 2022) with robust standard errors (HC3) and 5000 bootstrap samples. The indirect effect via perceived sustainability was positive and significant (EST = 0.56, SE = 0.155, 95 % CI = 0.284 to 0.893), thus providing support for H4a. While the indirect effect via perceived healthiness was marginally significant (EST = 0.11, SE = 0.061, 90 % CI = 0.014 to 0.221), its direction is opposite to the prediction stated by H4b. Indeed, the “rescued” claim increased perceived healthiness (EST = 0.69, SE = 0.162,  $p < 0.001$ ), whereas healthiness only slightly increased purchase intention (EST = 0.16, SE = 0.083,  $p = 0.061$ ). We found no significant indirect effect of the “rescued” claim on purchase intention via expected taste (EST = 0.01, SE = 0.112, 95 % CI = -0.219 to 0.223), because the “rescued” claim did not decrease perceived taste (EST = 0.02, SE = 0.19,  $p = 0.901$ ). Therefore, H4b and H4c are rejected.

To test the moderating role of ingredient familiarity, we used the PROCESS model 7 (Hayes, 2022) with robust standard errors (HC3) and 5000 bootstrap samples. The interaction between the “rescued” claim and ingredient familiarity on perceived sustainability was positive and significant ( $b = 0.84$ , SE = 0.321,  $p = 0.009$ ). In line with H5a, the positive effect of the “rescued” claim on perceived sustainability increased when the ingredient was familiar ( $b_{\text{Familiar}} = 2.49$ , SE = 0.201,  $p < 0.001$ ;  $b_{\text{Unfamiliar}} = 1.65$ , SE = 0.250,  $p < 0.001$ ). Fig. 1 displays these effects. Through perceived sustainability, the indirect effect of the “rescued” claim on purchase intention was significant across both levels of familiarity (upcycled food with unfamiliar rescued ingredient: EST = 0.45, SE = 0.142, 95 % CI = 0.210 to 0.762; with familiar rescued ingredient: EST = 0.67, SE = 0.187, 95 % CI = 0.341 to 1.074). The difference between both indirect effects was significant, as indicated by the index of moderated mediation (IoMM; EST = 0.23, SE = 0.105, 95 % CI = 0.048 to 0.464).

The interaction between the “rescued” claim and ingredient familiarity on perceived healthiness was non-significant ( $b = -0.29$ , SE = 0.323,  $p = 0.375$ ), leading to the rejection of H5b. Likewise, the interaction between the “rescued” claim and ingredient familiarity on perceived taste was non-significant ( $b = -0.01$ , SE = 0.354,  $p = 0.970$ ),

leading to the rejection of H5c. Fig. 2 summarizes the results of the moderated mediation analysis.

#### 4. Discussion

Our study is the first one to investigate how the “rescued” claim affects product perception and purchase intention for food products made with unfamiliar and familiar rescued ingredients. Our results show that displaying the “rescued” claim has a positive impact on purchase intention, this effect can be attributed to an increased perception of sustainability.

The presence of the “rescued” claim significantly increased the perceived sustainability of products with both unfamiliar and familiar rescued ingredients, subsequently raising purchase intentions. These results are consistent with previous research suggesting that foods enriched with rescued ingredients are perceived as environmentally beneficial (Coderoni & Perito, 2021; Grasso et al., 2023). Furthermore, the effect of the “rescued” claim on perceived sustainability was significantly higher for familiar rescued ingredients compared to unfamiliar ones. This result aligns with our prediction and is also consistent with previous research suggesting that unfamiliarity may reduce a product’s perceived usefulness for the environment (Hellali & Korai, 2023).

The “rescued” claim also had a significant and positive effect on perceived healthiness, although no significant indirect effect was observed. One possible explanation for this result could be that since we analyzed the effect of the “rescued” claim for a hedonic product, healthiness did not play a major role in driving purchase intention. This is consistent with what has been observed for hedonic products carrying other environmental-related claims (Nadricka et al., 2020). Therefore, an indirect effect might be observed with utilitarian products, where health plays a more important role. More central to this research is the possibility that the association of the “rescued” claim with sustainability traits might have spilled over to inferences about the perceived healthiness of upcycled food compared to conventional products. This corroborates previous literature revealing positive effects of environmental-related claims on a product’s perceived healthiness (Schuldt et al., 2012). Moreover, although additional research is needed, given that in the German language, an individual who rescues might be considered a “hero,” we speculate that the word “rescued” might trigger the so-called “savior effect” (Ketron & Naletelich, 2019) whereby this positive association might overshadow any negative ones that could

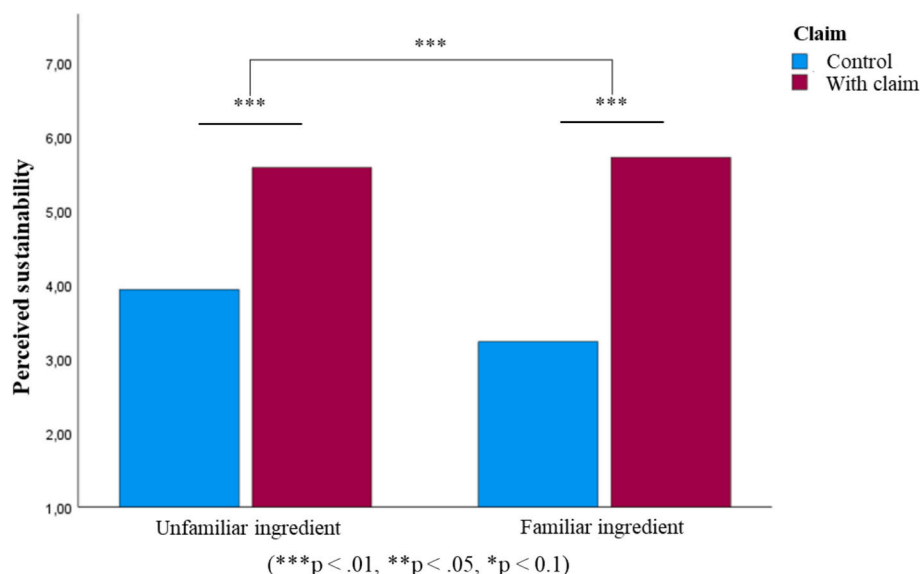


Fig. 1. Moderating effect of ingredient familiarity on “rescued” claim.

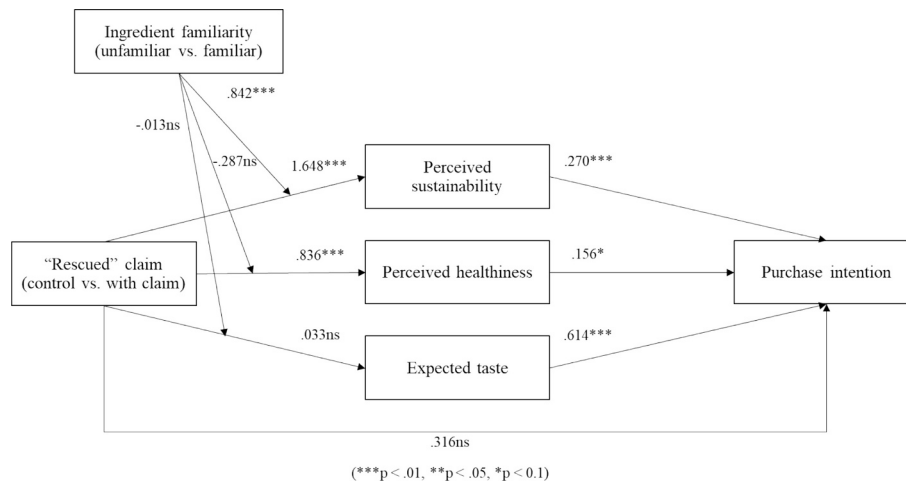


Fig. 2. Parameter estimates.

have led to a reduction of the product's perceived healthiness. This bias holds implications for policymakers as it could potentially increase the consumption quantity of upcycled hedonic products, thereby posing risks to consumers' health.

We did not find evidence that the "rescued" claim leads to biased consumer inferences regarding the expected taste. However, the food with the familiar ingredient scored significantly higher than the one with the unfamiliar ingredient, meaning that the expected taste is primarily influenced by the rescued ingredient itself rather than its status as "rescued". While this result contradicts the notion that consumers generally perceive previously discarded food to be less tasty (de Hooge et al., 2017), it is consistent with other studies showing that the expected taste varies depending on the origin of the rescued ingredient (Nitzko & Spiller, 2019).

From a managerial perspective, our findings are relevant, as they suggest companies utilizing rescued ingredients may benefit from clearly communicating this through a claim on their product packaging. We investigated the effect of the claim for highly processed rescued ingredients (chocolate and malted milk). Compared with fresh rescued ingredients, like fruits or vegetables, it is probably less likely for consumers to associate processed ingredients with characteristics that could have negatively affected taste, such as being old or rotten, which might have mitigated the prospective negative effect of the "rescued" claim (Aschemann-Witzel & Stangherlin, 2021). Future research should investigate how consumers expect the upcycled food product to taste when the rescued ingredient is originally unprocessed.

Additionally, we aim to draw attention to the potential misuse of the "rescued" claim. Given its lack of regulation, companies may opportunistically begin to add this claim to their products, aiming to enhance their perceived sustainability. This might be an issue if the products do not genuinely contribute to food waste reduction, such as utilizing ingredients that were not actually previously wasted. Moreover, although food waste reduction is a sustainability goal, policymakers must ensure that using these rescued ingredients for human consumption does not conflict with other sustainability goals, such as curbing greenhouse gas

emissions. This poses a considerable challenge, particularly concerning emissions from transporting these rescued ingredients.

This study, while offering valuable insights, is not without limitations. First and foremost, the findings may not be entirely generalizable to all consumers. Given the characteristics of our sample (predominantly young and highly educated participants), the generalizability of our findings beyond this demographic is limited.

Another limitation that offers avenues for future research is an exclusive focus on the "rescued" claim without consideration of additional marketing strategies. For example, de Hooge (2025) found that pricing strategies are most promising to increase purchase intention for products with aesthetic flaws but reduce their perceived value. By contrast, naturalness and show strategies increase both purchase intention and product perceptions (de Hooge, 2025). In their examination of plant-based meat alternatives, Erhard et al. (2024) found that claims, such as "tasty" or "sustainable" interact with underlying consumer goals. Accordingly, future research could align "rescued" labeling with additional marketing strategies to maximize purchase intention of upcycled foods with rescued ingredients.

#### CRediT authorship contribution statement

**Fernanda Silveira Carneiro:** Writing – review & editing, Writing – original draft, Validation, Software, Project administration, Methodology, Investigation, Formal analysis, Conceptualization. **Steffen Jahn:** Writing – review & editing, Writing – original draft, Visualization, Conceptualization. **Jessica Aschemann-Witzel:** Writing – review & editing, Conceptualization. **Yasemin Boztug:** Writing – review & editing, Supervision, Resources.

#### 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.

## Appendix A

Exemplary stimuli with familiar ingredient and "rescued" claim (left) and with unfamiliar ingredient and no claim (right).



## Data availability

Data will be made available on request.

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