

**A Tale of Two Cookies - The Effects of Vegan Labeling and Green Packaging on Consumer Impressions For Unexpected Vegan Products With Respect to Different Diets**

Fiete Schritt

S3906175

Department of Psychology, University of Groningen

PSB3E-BT15: Bachelor Thesis

Group number: 2223-1a-12

dr. J.A.M. (José) Heesink

dr. E.F. (Eric) Rietzschel

In collaboration with:

J.T. Dernison, S.D. Lange, A. Reuter, C.A.E. van Staveren, T. van der Veen

February 2nd, 2023

## Abstract

The purpose of this experimental study is to examine the effect of vegan labels and packaging color (green vs. brown) on consumer perceptions of unexpected vegan products, specifically chocolate chip cookies. In the survey, 219 predominantly young participants were randomly assigned to one of four products (vegan labeled + green; vegan labeled + brown; unlabeled + green; unlabeled + brown) and asked to judge these products based on their perceived environmental friendliness, perceived healthiness, and expected taste. Results of the study reveal that the presence of a vegan label has a positive effect on perceived sustainability (halo effect), as well as a negative interaction effect between vegan labels and the color green on expected taste (horn effect). We found a dietitian difference, with omnivorous participants expecting the vegan-labeled products to be significantly worse tasting (horn effect), compared to the other participants (flexitarian, vegetarian, vegan). No other significant effects are found for perceived sustainability, perceived healthiness, or expected taste, the green packaging is not influential on its own. The results should be interpreted with caution as the study has some limitations in design and scope. The implications of the study are overall ambiguous. Nonetheless, labeling vegan products stands desirable, as it promotes transparency, and makes a plant-based diet more accessible, which is ultimately good for the planet. Future research should investigate the effects of vegan labeling on consumer perceptions further by focusing on dietitian differences.

*Keywords: label, vegan, environmentalism, health, taste, dietitian identity, packaging, green, unexpected vegan, halo effect*

## **A Tale of Two Cookies - The Effects of Vegan Labeling and Green Packaging on Consumer Impressions For Unexpected Vegan Products With Respect to Different Diets**

In recent years, more people started following a meatless diet, due to concerns about animal welfare, to protect the environment, or their personal health (Hielkema et al., 2021). A vegan diet is based on the idea to minimize animal harm and exploitation, which includes complete abstinence from animal-derived products, including meat, fish, dairy, and eggs (European Vegetarian Union, 2019). Even many non-vegans decide to reduce their weekly meat consumption (e.g. flexitarians); in the Netherlands, the percentage of adults who make a conscious effort to reduce their meat consumption increased from 13% in 2011 to roughly 43% in 2019 (Dagevos, 2021). This change of mind also led to an enormous growth in vegan products available, with an estimated revenue of 33.9 billion Euros by 2027 (Elkin, 2021, EMR, 2021). However, identifying vegan products can be challenging for consumers, as animal-derived ingredients may not be clearly labeled or may be hidden under unfamiliar names. For example, ingredients such as casein (derived from milk) and albumen (derived from eggs) may not be easily recognizable to consumers, particularly those who are not familiar with veganism. This lack of transparency can make it difficult for vegans/vegan-interested individuals to make informed purchasing decisions and may discourage them from trying new products. To address this problem, food manufacturers have started to label their products as vegan to attract vegan and vegan-curious consumers, as well as to differentiate their products from competitors. The most common vegan label for edible products is the V-Label, recognized by the European Vegetarian Union (2019). The V-Label is a registered trademark that signifies a product is suitable for vegans by meeting specific criteria, including the absence of animal-derived ingredients and animal testing (VSMK, 2016). However, the presence of a vegan label on a

product can elicit certain impressions or stereotypes, which can lead to misconceptions about the product, or the avoidance of such products altogether (Stremmel et al., 2022). This would be detrimental, as a vegan diet is widely recognized to have a positive impact on both the environment and the consumers' health (Zhou et al., 2018). In light of this, it is important to carefully examine the potential benefits and drawbacks of vegan labeling, and potentially break down such prejudices to encourage a more plant-based diet. The goal of this experiment ultimately is to provide valuable insight for manufacturers of vegan products and to make the transition to veganism easier and more accessible.

### **Perceived Environmental Friendliness**

The environmental impact of humans, including the production and consumption of food, has become a pressing concern in recent years (Friel et al., 2009). The evidence of global warming and the consequences of climate change are increasingly impossible to ignore, which has led to more people looking for ways to reduce their environmental footprint. In response, manufacturers began to include vegan labels on more of their products, in order to appeal to consumers who are aware of the widely-documented environmental benefits of a vegan diet (Melina et al., 2016; Zhou et al., 2018). A vegan diet requires approximately half the land, water, and energy resources compared to a non-vegan diet (Tilman & Clark, 2014), and results in significantly lower greenhouse gas emissions (Stehfest et al., 2009; Quam et al., 2017). However, not all products bearing a vegan label are inherently sustainable or environmentally friendly.

While labels are first and foremost a mere communication tool about food product's adherence to certain dietary restrictions, such labeling can evoke cognitive biases in consumers (Schuldt, 2013), where the perception of one trait can positively or negatively impact perceptions

of other traits of the same object (i.e. halo and horn effect, Burton et al., 2015). Previous research by Stremmel et al. (2022) established this effect for vegan labels as well. In their study, 398 predominantly young participants were given vegan products with either a vegan label on the packaging or no label at all. The participants had to rate these products on their perceived sustainability, healthiness, and expected taste. Ultimately, the researchers discovered that people perceived some vegan labeled products as more sustainable and healthier than the same products without the label (i.e. Halo effect; Stremmel et al., 2022). On the other hand, people also perceived those products as less tasty than their unlabelled counterparts (i.e. Horn effect). Both of these cognitive biases can result in distorted judgments and perceptions. Our research aims to replicate these findings.

Furthermore, other attributes of packaging besides labels have been established to have an effect on consumer perception, e.g., the color of a product (Huang & Lu, 2015). The word “green” has become a synonym for the concept of addressing environmental concerns and sustainability (Chen, 2010), leading manufacturers to respond to the rising demand for sustainable groceries by increasingly designing their products in green. When these products are not actually more sustainable than their competitors, or less sustainable than they appear to be, this is known as "greenwashing", which is misleading consumers and diverting attention away from products that are truly environmentally friendly (Nguyen et al., 2019).

We therefore argue that consumers tend to view a product as more environmentally friendly if labeled as vegan, or packaged in green. We will be using the color brown as the comparison condition. Consequently, we formulate the following hypotheses:

**H1a.** A vegan label (vs. no label) increases the perceived environmental friendliness of a product.

**H1b.** Green packaging (vs. brown) increases the perceived environmental friendliness of a product.

### **Perceived Healthiness**

In addition to the environmental benefits of a vegan diet, it is also often perceived as a healthy lifestyle choice (Reipurth et al., 2019). Indeed, a balanced vegan diet can provide all the necessary nutrients for a healthy lifestyle, as there are numerous studies that have shown the health benefits of a vegan diet, such as a lower risk of heart disease and certain cancers (Craig, 2009; Melina et al., 2016; Messina, 2014; Zhou et al., 2018). However, it is important to note that not all vegan products are inherently healthy, one can follow a vegan diet but still eat predominately processed, low nutritional, foods high in trans fats (Melina et al., 2016). Nevertheless, the perceived healthiness of a product can also be influenced by labeling, for instance, Besson et al. (2020) revealed how a burger labeled as vegetarian was perceived as less caloric. Likewise, as previously mentioned, vegan labeled products are perceived as healthier by consumers, due to the halo effect (Stremmel et al., 2022). Although some studies found that some people believe vegan meat alternatives are unhealthy, particularly regarding protein, this belief is often based on a lack of understanding about the protein content of plant-based foods (Pohjolainen et al., 2015). However, in this study, we will not examine meat alternatives, but products that were not specifically designed for vegans. I will go into more detail about this later.

Furthermore, the color of the packaging also plays a crucial role in shaping consumer perception of a product's healthiness. Green, in particular, is often associated with health and well-being (Huang & Lu, 2015). The color green, commonly associated with nature and natural things, has been shown to evoke feelings of calm and balance and has been linked to increased feelings of health and well-being (Palmer & Schloss, 2010). Given these associations with

health, manufacturers may use green in their packaging design to create the impression of a healthy product, with the hope that this will influence consumer purchasing decisions. Consequently, this can lead to a phenomenon known as "healthwashing" where the color is used to mislead consumers about a product's health benefits (Heiss et al., 2021).

Thus, consumers will be more likely to perceive a product as healthy when wrapped in green packaging and labeled as vegan. Accordingly, we formulate our second set of hypotheses:

**H2a.** A vegan label (vs. no label) increases the perceived healthiness of a product.

**H2b.** Green packaging (vs. brown) increases the perceived healthiness of a product.

### **Expected Tastiness**

The perceived tastiness of vegan products is closely linked to the perceived healthiness: Taste has often been named as a main barrier towards a plant-based diet (Pohjolainen et al., 2015; Reipurth et al., 2019), and while taste is, of course, subjective, it is important to understand the origin of these reactions: As mentioned above, vegan foods are mostly considered healthy (Reipurth et al., 2019), however, consumers in the EU also believe that healthy food necessarily compromises flavor (Kearney & McElhone, 1999). Hence, the idea that plant-based meals do not taste good may not be the consumers' actual experience, but rather a cultural narrative associated with this category of foods; the healthier products are considered to be, the worse the expected taste (Raghunathan et al., 2006). This is evident in Stremmel et al. (2022), who demonstrated participants preferred unlabelled vegan products over vegan-labeled products in regards to taste, as mentioned earlier..

Additionally, the lack of familiarity with vegan foods among non-vegan consumers contributes to the negative perception of their taste. Research shows that novel, unfamiliar

products are often less liked than products people are familiar with (Tuorila & Hartmann, 2020). Even so, food neophobia (refusal of trying new foods) is established to be the highest among people who are unwilling to reduce their meat intake (Hielkema & Lund, 2021). For these reasons, we will investigate potential differences in perception and attitudes towards vegan food among different diet groups, with a specific focus on the distinctions between animal product reducers/avoiders (vegans, vegetarians, flexitarians) and non-reducers (omnivores). As previous research has shown, the effectiveness of food packaging can vary depending on the consumer's diet (Noguerol et al., 2021). Additionally, as hinted earlier, negative stereotypes about the taste of vegan food are particularly prevalent among omnivores as opposed to those who eat less meat (Markowski & Roxburgh, 2019). Therefore, understanding how these diet-based differences influence consumer perception and attitudes towards vegan food is crucial in effectively marketing and promoting such products.

Furthermore, we do not have reasons to believe that green packaging alone will have an impact on expected taste. However, drawing on the idea that plant-based diets and the color green are closely linked to one another (e.g. plants being green), the idea of Conceptual fluency theory suggests using a color that is related to the content of a message can make the message easier to process and thereby increase its influence (Seo & Scammon, 2017). In this example, using green, a color that is associated with veganism, may strengthen the negative associations people have towards the taste of vegan products. Align with this, consumers may perceive green, vegan products as specifically made for vegans, and therefore not appetizing for the average non-vegan consumer.

For these reasons, first, we argue consumers are more likely to perceive products as less tasty if they are labeled as vegan, and second, especially if the packaging of the labeled product



is green. Also, we predict that omnivores rate the chocolate-chip cookies significantly worse in terms of perceived tastiness, if they are labeled as vegan. Accordingly, we formulate our third set of hypotheses:

**H3a.** A vegan label (vs. no label) decreases the perceived taste of a product.

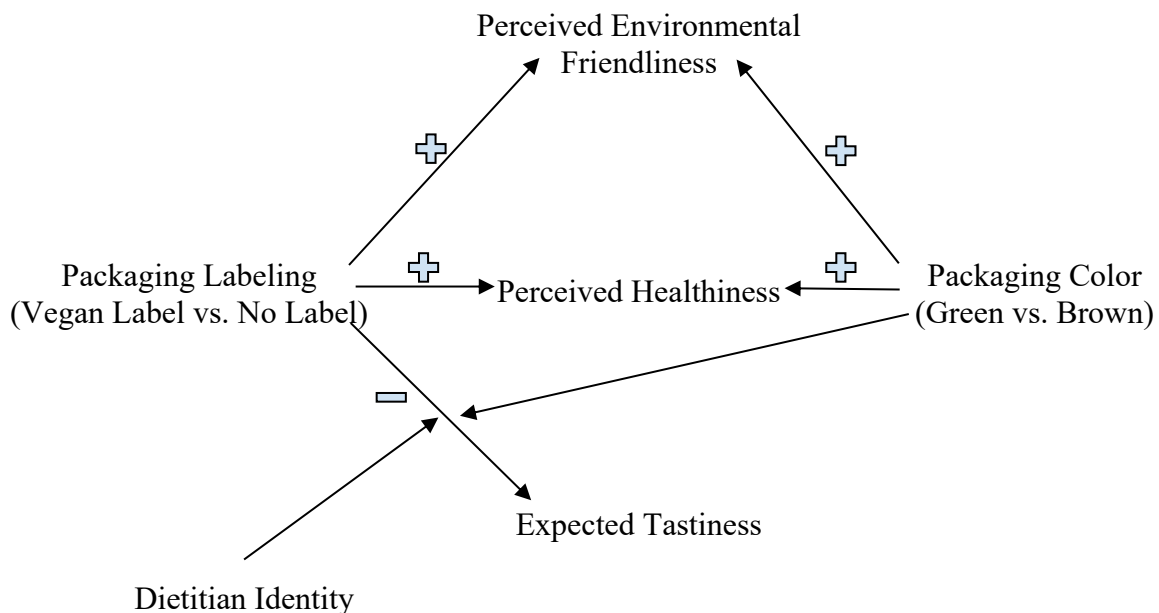
**H3b:** The product with a vegan label and green packaging will be perceived as the least tasty among the four designs.

**H3c:** Unlike animal-derived product reducers (flexitarian, vegetarian, and vegan participants) omnivores expect products bearing the vegan label to be significantly less tasty than the same products without the label.

Based on these hypotheses, we developed a conceptual model (see Figure 1).

**Figure 1**

*Conceptual Model*



*Note.* Dietitian Identity consists of omnivore vs. flexitarian, vegetarian, and vegan.

**Product Type**

Our study aims to examine these influences of a vegan label on consumer impressions, specifically on "unexpected vegan" products. By "unexpected vegan," we mean products that are accidentally vegan (i.e., they did not undergo specific reformulations and were not specifically aimed at the vegan consumer demographic, such as hummus, bread, juices), but also belong to a product category that typically contains animal ingredients like milk or eggs (e.g., chocolate chip cookies, see Appendix A for the cookie packaging used in this study). In this example, cookie dough typically contains eggs, while chocolate is often associated with milk, so consumers may assume the entire product category is non-vegan. However, there are vegan outliers in this product category, that do not use eggs for the dough, nor animal-based milk for the chocolate. Previous research by Stremmel et al. (2022) looked at the effect of a vegan label on both accidental but expected vegan products (hummus, marmalade), and unexpected vegan products (herbal spread, chocolate spread, see Appendix B for images), but only found significant results for the latter. The vegan label on unexpected vegan products challenges consumers' pre-existing views of the products. Therefore, it has the greatest informational impact, compared to vegan labels on accidentally vegan but expected products (i.e., products that consumers already assume to be vegan) or intentionally vegan products (e.g., meat/dairy alternatives).

While the study on the effects of vegan labeling by Stremmel et al. (2022) has already provided valuable insights into how consumers respond to such labels, it displays a limitation in that they only considered products that looked like such found in green markets or the organic section of a supermarket (e.g. herbal spreads). These products are typically perceived as healthier, more sustainable options, that are also more likely to be vegan, and therefore may not accurately reflect the choices made by the average consumer, as healthy packaging is less effective in inspiring a healthy product experience if in the context of a green supermarket (Van

Rompay et al., 2016). To address this limitation, we propose to replicate the findings of the original study with a new sample of products that can be found anywhere in the store. Namely, we designed a fictional chocolate-chip cookie brand, as cookies are generally considered a common product. By doing so, we hope to gain a better understanding of how the average consumer is influenced by vegan labels, regardless of the products' original perceived healthfulness or eco-friendliness. It will help us further understand the impact of vegan labels in a more relatable and general product scenario.

## Methods

### Participants

For this study a convenience sample was used, consisting mostly of the researchers' friends, family, and further acquaintances. The researchers are third-year undergraduate psychology students from the University of Groningen. The online questionnaire received 476 responses, of which 240 participants completed the entire questionnaire. Before the research began, we established that only participants who failed a maximum of one attention check question will be included in the sample, to avoid skewed results. 21 participants failed this criterion and were excluded from the sample. This left a total of 219 valid responses for the data analysis. Of these, 145 identified as female, 72 as male, and 2 did not specify their gender. The ages of the participants ranged from 16 to 63 ( $M = 26.9$ ,  $SD = 10.4$ ). In terms of nationalities, 39.7% ( $N = 87$ ) were from the Netherlands, 49.3% ( $N = 108$ ) were from Germany, and the remaining 11% ( $N = 24$ ) were from other countries. Regarding their dietary habits, 34.2% ( $N = 75$ ) identified as omnivorous, 37% ( $N = 81$ ) as flexitarian, 19.2% ( $N = 42$ ) as vegetarian, and 9.6% ( $N = 21$ ) as vegan. Concerning education, 1.8% ( $N = 4$ ) had not completed high school,

45.2% ( $N = 99$ ) had a high school degree, 37% ( $N = 81$ ) had a bachelor's degree, 14.2% ( $N = 31$ ) had a master's degree, and 1.8% ( $N = 4$ ) had a higher degree than a master's.

## **Study Design**

We performed an experimental study using a 2 (packaging color: green vs. brown) x 2 (label condition: label vs. no label) between-subjects design. Participants were randomly assigned to one of the four experimental conditions, specifically: a) brown packaging without a vegan label; b) brown packaging with a vegan label; c) green packaging without a vegan label; d) green packaging with a vegan label (see Appendix A for Images).

## **Procedure**

Data was obtained from November 22nd until December 1st, 2022 through an online questionnaire that was made using Qualtrics (Version 12/22) and sent to the researchers' friends and acquaintances, or posted on social media. The questionnaire was in English and took around 10-15 minutes to complete. Each participant got one out of four possible designs (see Appendix A). The data were collected within one session and no compensation was provided to the participants. The experiment has been approved by the Ethics Committee of Psychology at the University of Groningen.

The role of the researcher was to send a link to the online questionnaire to potential participants, without having an active role during the experiment. Participants first read an information section about what was being asked of them, how their data was assessed, and what their rights were, and a brief introduction leading into the survey. After completing the informed consent form, participants were asked whether they eat cookies, as individuals who do not typically consume or purchase cookies could skew the data. If these conditions were met,

participants were asked to fill out the survey items regarding the dependent variables (perceived sustainability, perceived healthiness, expected taste, intention to buy) and mediators (diet type, biospheric values, health consciousness, income/grocery budget, masculinity). Relevant to this present study are perceived sustainability, perceived healthiness, expected taste, and diet. In between, attention checks consisting of three questions were built in, where the participants were told to tick a specific answer option. In closing, participants filled out their demographic comprising age, gender, nationality, highest completed level of education, and whether they consider themselves vegan, vegetarian, flexitarian, or omnivorous.

## **Materials**

### ***Independent Variables: Vegan Label and Packaging Color***

We utilized two independent variables, one being a vegan label (vs no label) and the other one being a green packaging design (vs brown). The label we used is the most common vegan label for foods (V-Label; European Vegetarian Union, 2019). Participants were randomly assigned to one of four experimental conditions: green packaging with a vegan label, green packaging without a vegan label, brown packaging with a vegan label, and brown packaging without a vegan label

### ***Dependent Variables: Perceived Environmental Friendliness, Perceived Healthiness, Expected Taste***

To investigate the effect of a vegan label vs no vegan label on consumer impressions, three items were included: "Compared to other chocolate chip cookies, I think the chocolate chip cookies shown are healthier"; "Compared to other chocolate chip cookies, I think the chocolate

chip cookies shown taste nicer"; "Compared to other chocolate chip cookies, I think the chocolate chip cookies shown are more environmentally friendly". The questions were answered on a 7-point Likert scale (1= Strongly disagree, 7= Strongly agree) and produced an acceptable Cronbach's alpha ( $\alpha = .787$ ) This questionnaire was inspired and based on a study by Stremmel et al. (2022), but slightly altered.

### ***Moderating Variable***

At the end of the survey, we measured the participants' dietarian identity, based on their consumption of animal products. For this, participants answered a single question, where they were asked to categorize themselves into one of four groups: vegan, vegetarian, flexitarian, and omnivore.

## **Results**

All statistical analyses were performed in IBM SPSS (version 29, MacOS). Assumptions concerning normality, outlier, and homogeneity of variance were checked for all following analyses, with no evidence of violation present. The significance level was set at  $p < .05$ .

We tested the first hypothesis that a vegan label and green packaging, respectively, increase perceived environmental friendliness by conducting a 2 (green vs brown) x 2 (vegan label vs no label) univariate ANOVA to examine the main effects of these independent variables. Our results showed that the presence of a vegan label did have a significant impact on the perceived environmental friendliness,  $F(1, 215) = 12.425, p < .001$  (see Table 1 and Figure 2). The mean of the label condition was 4.23 ( $SD = 1.63$ ), and 3.48 ( $SD = 1.53$ ) for the No-Label condition. This suggests that consumers may be more likely to perceive unexpected vegan products as more environmentally friendly if they are labeled as vegan.

However, the color of a product did not significantly influence its perceived environmental friendliness ( $F(1, 215) = 0.22, p = .65$ ), with a mean of 3.92 ( $SD = 1.65$ ) for green, and 3.84 ( $SD = 1.6$ ) for brown. This implies that green packaging does not have an influence on the perceived environmental friendliness of unexpected vegan products. A significant interaction effect was not present ( $F(1, 215) = 0.373, p = .54$ ).

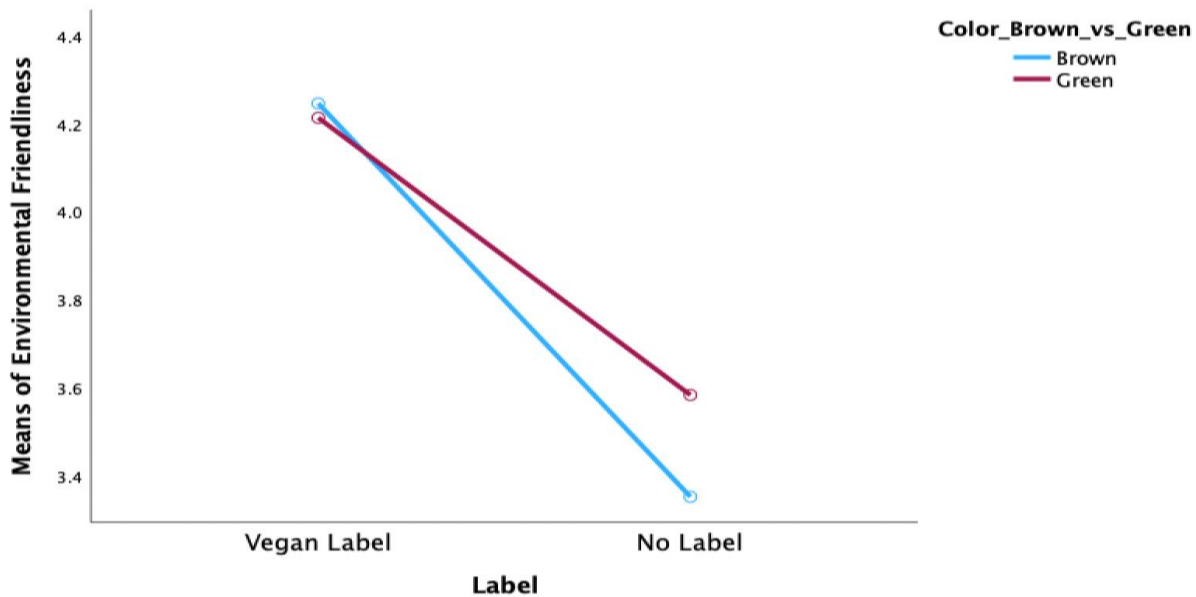
**Table 1**

*Effects of Label/Color on Perceived Environmental Friendliness*

	<i>df</i>	<i>F</i>	<i>p</i>
Label vs. No Label	1,215	12.425	<.001
Color Green vs. Brown	1,215	.221	.646
Interaction Label+Color	1,215	.373	.542

**Figure 2**

*Means of Perceived Environmental Friendliness*



*Note.* The measurement scale ranged from 1 to 7.

For the second hypothesis, we tested that a vegan label and green packaging, respectively, increase perceived healthiness by conducting a 2 (green vs brown) x 2 (vegan label vs no label) univariate ANOVA to examine the main effects of these independent variables. The main effect of vegan labels on perceived healthiness was not significant ( $F(1, 215) = 0.35, p = .56$ ) with a mean of 3.46 ( $SD = 1.47$ ) for the label condition, and a mean of 3.35 ( $SD = 1.35$ ) for No-Label. Therefore, we cannot reject the null hypothesis that a vegan label has no effect on perceived healthiness. Similarly, the mean of the green conditions ( $M = 3.45, SD = 1.42$ ) and brown conditions ( $M = 3.36, SD = 1.42$ ) on perceived healthiness did not differ significantly from each other, with  $p = .64$  ( $F(1, 215) = 0.22$ ). This indicates that green packaging, as well as



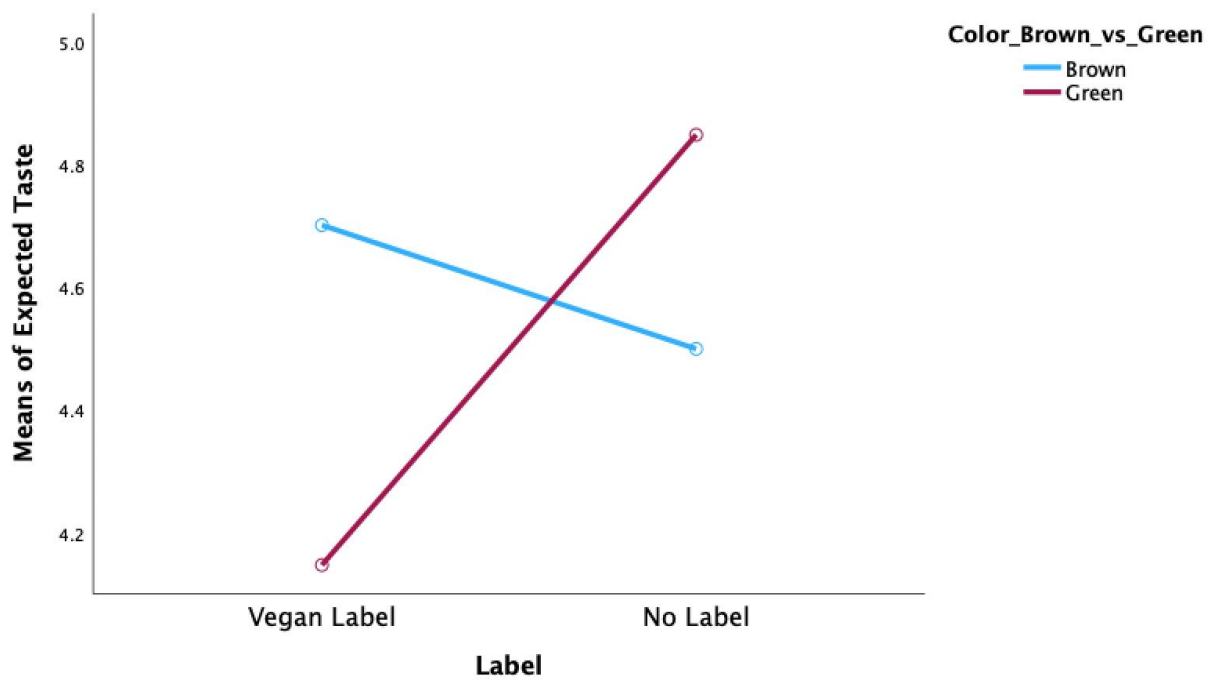
the presence of a vegan label, seemingly do not significantly impact the perceived healthiness of a product overall. An interaction effect was not present ( $F(1, 215) = 0.08, p = .78$ ).

For the third main hypothesis, we conducted a 2 (green vs brown) x 2 (vegan label vs no label) univariate ANOVA to examine the main effect of vegan labels, as well as the interaction effect between vegan labels (vs. no label) and green (vs. brown) packaging. We hypothesized that a vegan label (vs. no label) decreases the expected tastiness of the cookies. The main effect was non-significant, with  $p = .14$  ( $F(1, 215) = 2.17$ ), a mean of 4.42 ( $SD = 1.31$ ) for labeled products, and a mean of 4.68 ( $SD = 1.22$ ) for unlabeled products. Thus, we failed to reject the null hypothesis that a vegan label has no effect on the expected tastiness of unexpected vegan products.

Furthermore, we expected the product with a vegan label and green packaging, combined, to be perceived as the least tasty among the four designs. Our findings showed that the interaction effect between the vegan label and green packaging was statistically significant,  $p = .008$  ( $F(1,215) = 7.08$ ; see Table 2). This indicates that the effect of one variable on perceived taste was influenced by the presence of the other variable, suggesting that the two factors may have a synergistic effect on consumer perceptions. More accurately, the vegan label only seems to have a negative effect when combined with green packaging (see Figure 3), with green + label scoring the lowest ( $M = 4.15, SD = 1.29$ ), compared to green + no label ( $M = 4.85, SD = 1.26$ ), brown + label ( $M = 4.7, SD = 1.28$ ), and brown + no label ( $M = 4.5, SD = 1.15$ ).

**Table 2***Effects of Label/Label with Color on Expected Taste*

	<i>df</i>	<i>F</i>	<i>p</i>
Label vs. No Label	1,215	2.168	.142
Interaction Label+Color	1,215	7.081	.008*

**Figure 3***Means of Expected Taste for Label/Color*

*Note.* The measurement scale ranged from 1 to 7.

To test our moderating variable about the effects of dietarian identities, we used a 2 (vegan label vs no label) x 2 (omnivorous vs. flexitarian/vegetarian/vegan) univariate ANOVA. We hypothesized that, unlike the animal product reducer/avoider (flexitarian, vegetarian, vegan), omnivores will perceive vegan-labeled products as significantly less tasty than the same products without the label. The results were statistically significant in favor of our hypothesis,  $F(1,125) = 4.5, p = .035$  (see Table 3). As shown in Figure 4, omnivores rated the cookies with a vegan label significantly worse ( $M = 3.87, SD = 1.3$ ) compared to the rest ( $M = 4.68, SD = 1.24$ ).

**Table 3**

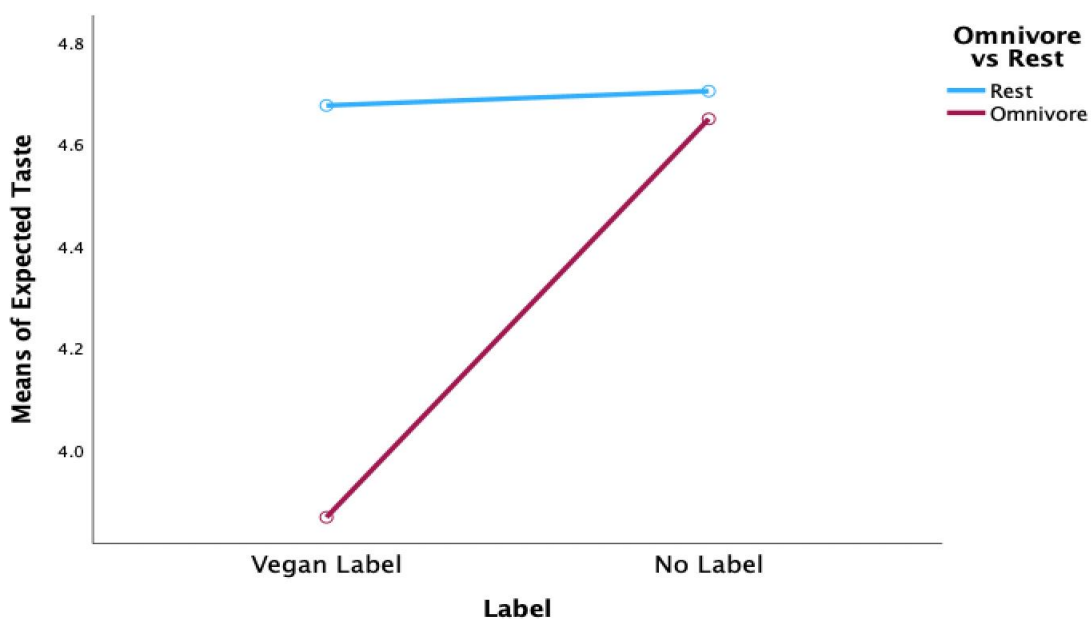
*Effects of Label on Expected Taste mediated by Dietarian Identity*

	<i>df</i>	<i>F</i>	<i>p</i>
Label vs. No Label	1,215	2.168	.142
Interaction Label+Diet	1,215	7.081	.008

*Note.* The mediating variable “Diet” entails omnivore participants vs. the rest (flexitarian, vegetarian, vegan).

**Figure 4**

*Means of Expected Taste for Label Mediated by Diet*



*Note.* Rest = flexitarian, vegetarian, and vegan participants; the measurement scale ranged from 1 to 7.

## Discussion

### Vegan Label vs. No Label

In our study, we sought to uncover the impact of vegan labels on consumer perceptions of unexpected vegan products. Participants were presented with either a labeled or unlabeled version of the same product (chocolate chip cookies) and asked to rate them on various attributes. We hypothesized that consumers will perceive unexpected vegan products bearing the vegan label as more environmentally friendly, and healthier, but less tasty than the same products without the label. The results suggest that the presence of vegan labels on unexpected vegan

products does in fact influence consumer impressions. However, we only found this relationship to be significant on the perceived environmental friendliness (i.e. Halo effect), and not for the perceived healthiness, nor the expected tastiness. Thus, including vegan labels on such products appears to be advantageous for food manufacturers as it attracts vegan consumers without negatively affecting the perception of their products. However, we acknowledge the risk that consumers might be misled into overestimating the eco-friendliness of a product. For instance, this cookie product contained palm oil, which is contributing immensely to acute harm to the environment (Koh et al., 2011). Therefore, we advise consumers who are trying to consume sustainably to instead seek out products with real sustainability labels, e.g., the Rainforest Alliance seal (Rainforest Alliance, 2022) to ensure that they are making environmentally conscious purchasing decisions, instead of relying on vegan labels.

Nonetheless, we remain aware that labeling is important for people following a vegan diet. The label serves as a valuable source of information for vegans, so they can easily identify suitable products without having to meticulously review each individual ingredient list. This is also helpful for vegetarians, flexitarians, or even omnivores, who also occasionally want to choose the vegan option, but have less familiarity with identifying vegan products in their supermarkets.

Important to mention is that our results are partly inconsistent with the findings of Stremmel et al. (2022). They found significant correlations between not just vegan labels (vs. no label) and perceived environmental friendliness, but also perceived healthiness and expected taste, the latter being a negative correlation. The cause for these inconsistencies could be an issue with the wording of our survey items that may have influenced our results, which we only identified after data collection; as we asked participants to rate their agreement with the

statement “Compared to other chocolate chip cookies, I think the chocolate chip cookies shown look healthier” on a scale from strongly disagree to strongly agree, we noticed some variability in how participants interpreted and responded to these survey questions. Some of the participants that thought the cookies do not look tastier compared to other cookies (but also not less tasty), ticked the most neutral answer possible (neither agree or disagree), while others indicated that they (strongly) disagree with the statement that the cookies look superior in taste, even if they did not think they would taste worse. Instead, we should have asked to rate the cookies from “worse tasting” to “better tasting”, like the original study did (“Compared to other (sweet) spreads, I think the (sweet) spread pictured above is ... 1 = worse tasting/7 =better tasting.”, Stremmel et al., 2022). The poor wording might have affected the power of the statistical test, making it less likely to detect a true effect between the variables, even if one exists.

### **Color Green vs. Brown**

For our analysis of the second independent variable, we hypothesized whether green packaging influences the perceived healthiness and environmental friendliness of an unexpected vegan product. It revealed that green does not significantly influence consumer perceptions, and does therefore not engage in greenwashing or healthwashing. Although we are the first to test the effects of the color green on this specific type of product (unexpected vegan products) the discrepancy between our and other similar studies is striking. For instance, Seo and Scammon (2017) showed that using green on a product's packaging can improve consumers' perceptions of the brand's environmental impact. Further research demonstrated that products in green packages were perceived as healthier by consumers (Huang and Lu, 2015) and similarly, a green nutrition label on a candy bar made it appear healthier, compared to a red or white label (Schuldt, 2013). We suspect that the reason for our insignificant results is the type of color we chose as the

comparison design. While most other studies worked with white or red packaging as the comparison, we chose the color brown. In hindsight, the color brown might not have been the best choice, as it has some similar associations as the color green. For instance, as Howell (2018) wrote, “Brown can also be used for organic presence, natural farming and can stimulate appetite... Most of the time, organic food brands use brown alongside green to associate fresh and natural”. Further research is needed to fully understand the effects of color on consumer perception and the implications for marketing plant-based products.

### **Interaction Between Label and Color**

Furthermore, we hypothesized that the product combining both the vegan label and green packaging will have the lowest rating concerning taste. The interaction effect of our two independent variables for perceived tastiness indeed shows that the presence of a vegan label had a negative effect on expected tastiness only when the packaging was green (e.g. horn effect). This could be due to a variety of factors, such as the belief that vegan products are not as tasty as non-vegan products, and that, moreover, the combination of a vegan label and green packaging somehow highlights the fact that this product is vegan. We theorize the presence of the green color possibly strengthens the associations people hold towards veganism (healthier=less tasty). This is similar to the findings of Seo and Scammon (2017) who discovered that a color matching the content of a message (e.g. veganism) makes the information easier to process, thereby increasing the influence of that message (e.g. the negative association people hold towards veganism).

Also, Vegan products are commonly packaged in green packaging, making it a reliable heuristic of a product being vegan. Therefore, a product without the green color might simply look like it is suitable for vegans, but not exclusively made for them. However, with the green

color, it potentially came across as for vegans only, and therefore not attractive or appetizing for non-vegans. Thus, packaging designers and producers have to be mindful of what target audience they want to reach and design their products accordingly. If they aim to reach the general population they should maybe sustain from using both vegan labels and a green packaging design, and only focus on the label. However, without the green features, vegan consumers might then have a harder time identifying vegan products from afar.

### **Dietarian Identity**

Finally, we wondered if omnivores rate the taste of unexpected vegan products worse compared to flexitarian, vegetarian, and vegan participants. As predicted, we found evidence that for omnivores, a vegan label on unexpected vegan products decreases the perceived tastiness of said product significantly more, compared to other dietarian groups. In line with our research, Reipurth et al. (2019) looked at the differences between people with a high intake of animal products/meat products (e.g. omnivores) against people with a low intake of animal products (e.g. flexitarians/vegetarians/vegans). The former demonstrated negative attitudes towards plant-based products in terms of protein content, satiety effect, and taste, while people with low animal product intake did not. Additionally, the perceived taste of plant-based products has been repetitively identified as the main barrier for omnivores to reduce their intake of animal products (Rosenfeld & Tomiyama, 2020). Conclusively, the presented evidence suggests that the labeling practice may not be profitable for packaging designers who aim to appeal to not only flexitarian/vegetarian/vegan consumers but also omnivores, as they make up the largest percentage of our population, and therefore generate the most revenue. However, labeling vegan products is necessary, convenient for consumers, and simplifies the shift to a more plant-based diet, which is especially important in the face of the current and ongoing climate crisis. Future



research should therefore rather explore how to break such biases of omnivorous consumers, as they are essentially socially constructed (Raghunathan et al., 2006), and wind up inaccurate when challenged (Niimi, et al., 2022).

### **Further Limitations and Appeals to Future Research**

Aside from the previously mentioned shortcomings, there are some other limitations of the study that we need to address and be aware of. As this study was conducted as part of a bachelor's thesis, certain constraints on time and resources may have impacted the scope of the research. Also, in order to enhance the ecological validity of our study, it would have been advantageous to include a wider range of products that fall into the category of "accidental and unexpected" vegan. By not doing so, our results may be primarily applicable to chocolate chip cookies. Expanding the scope of our product category could provide a more nuanced understanding of the effects under investigation. Also, asking participants to compare to "other cookies" without standardizing the comparison cookies created potential confounds.

Furthermore, it would have been beneficial to have a larger sample of vegan participants, in order to more thoroughly examine the impact of dietary identity. This could provide further insights into the differences beyond what we have observed in our study, for instance, we would expect vegan participants to be more aware of the environmental impact of palm oil in the cookies compared to other diets, therefore showing no increase in perceived sustainability.

Also, the majority of people in our convenient sample were young students from the Netherlands and Germany, future researchers should investigate different ages and education levels, as young students are generally more open to veganism compared to those who are older, and not university-educated. Similarly, other cultures might react differently to veganism and its

associated attributes, for instance, french consumers associate healthiness with good taste (Werle et al., 2013).

Furthermore, we suggest that future researchers utilize the survey items provided by Stremmel et al. (2022) rather than our own. Also, in order to discover more about the effect of green packaging, we recommend using either white or red packaging as the control condition instead of brown, to avoid overlapping associations.

In conclusion, the findings of this study are ambiguous due to its study design, limited resources, and other limitations. The results, therefore, need to be interpreted with caution. Though, we believe we developed an important framework for future research on this topic. Our study provides further insights into how vegan labeling and packaging color can impact consumer perceptions of unexpected vegan products. Vegan labels possibly enhance the perceived environmental friendliness of an unexpected vegan product (halo effect), while also negatively influencing the expected taste of green packaged versions of such products (horn effect). Despite these byproducts, we believe that the label is important as it primarily increases the transparency around veganism. Also, it is hard to say if these effects are necessarily misleading. Vegan chocolate chip cookies should, in theory, be better for the environment compared to their non-vegan counterparts, as they are being produced without the involvement of the environmentally harmful milk industry. However, we still suggest consumers to orient themselves at actual sustainability labels, as plant-based products can still contain environmentally harmful ingredients such as palm oil. Coloring packages in green only demands caution when in combination with vegan labels, should however still be used for enhanced visibility of vegan products from a consumer perspective. The negative experience of taste by omnivores, provoked simply by a vegan label, urges for future research to tackle these

prepossessions to ensure more sustainable consumer behavior. Veganism is the more sustainable lifestyle for our environment, our health, and the health of other animals.

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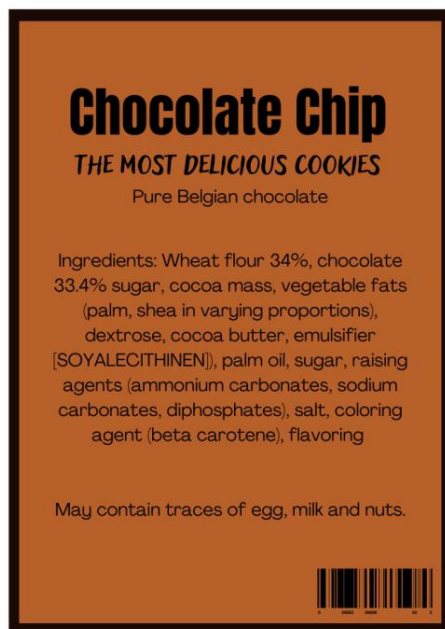
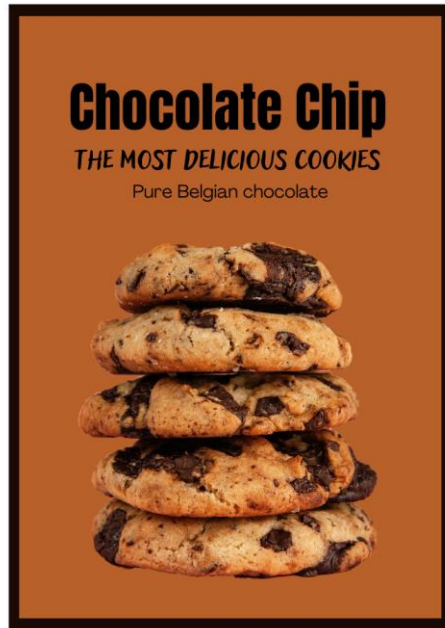
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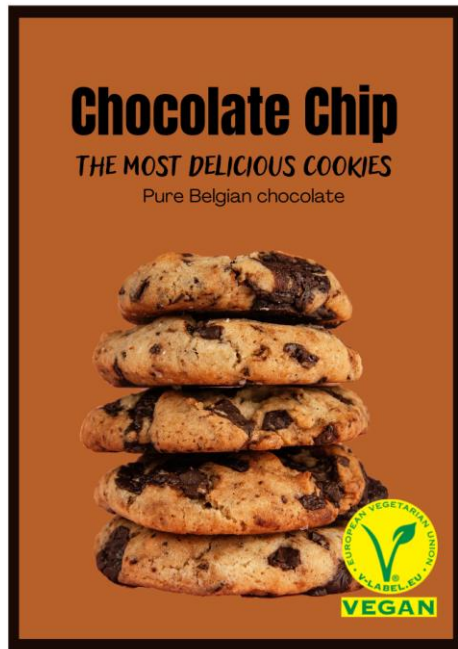
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## Appendix A

## Images of the Chocolate Chip Cookies Packagings Used in The Present Study




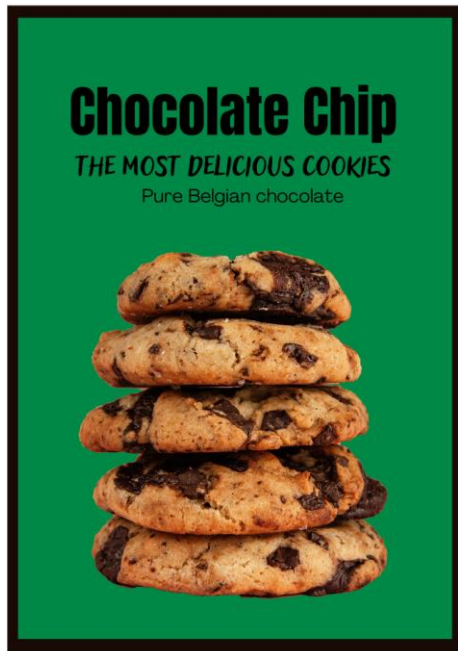


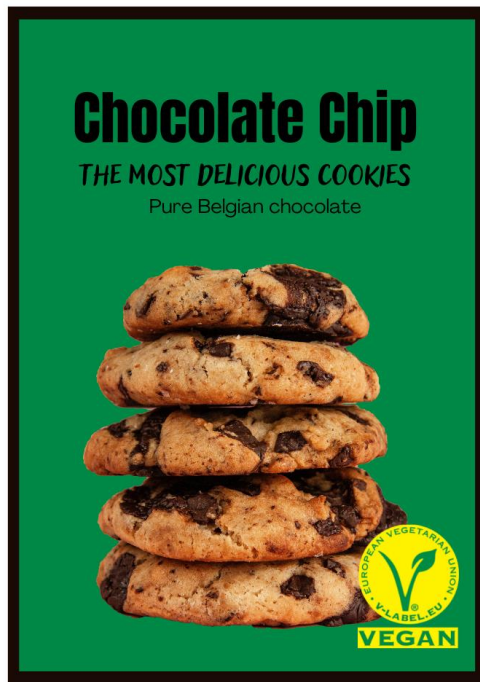
**Chocolate Chip**  
*THE MOST DELICIOUS COOKIES*  
 Pure Belgian chocolate

Ingredients: Wheat flour 34%, chocolate 33.4% sugar, cocoa mass, vegetable fats (palm, shea in varying proportions), dextrose, cocoa butter, emulsifier [SOYALECITHINEN]), palm oil, sugar, raising agents (ammonium carbonates, sodium carbonates, diphosphates), salt, coloring agent (beta carotene), flavoring

May contain traces of egg, milk and nuts.







Product Images From Stremmel et al. (2022)

W = 0 (Expected-vegan) & Z = 0 (Utilitarian)  
Hummus



W = 1 (Unexpected-vegan) & Z = 0 (Utilitarian)  
Spread with herbs



W = 0 (Expected-vegan) & Z = 1 (Hedonic)  
Raspberry jam



W = 1 (Unexpected-vegan) & Z = 1 (Hedonic)  
Nut-nougat chocolate spread



„Ideal als Brotaufstrich“ = Ideal as a sandwich spread