



A reversal of defaults: Implementing a menu-based default nudge to promote out-of-home consumer adoption of plant-based meat alternatives

Danny Taufik^{a,*}, Emily P. Bouwman^a, Machiel J. Reinders^b, Hans Dagevos^b

^a Wageningen University & Research, Wageningen Economic Research, P.O. Box 35, 6700 AA, Wageningen, the Netherlands

^b Wageningen University & Research, Wageningen Economic Research, P.O. Box 29703, 2502 LS, The Hague, the Netherlands

ARTICLE INFO

Keywords:

Default nudge
Plant-based meat alternatives
Meat consumption
Restaurants
Consumer behavior

ABSTRACT

Restaurants are characterized by high levels of meat being consumed in this out-of-home setting, while plant-based meat alternatives remain a niche product, thus preserving a high environmental impact of food consumption. We tested whether subtly re-designing the restaurant menu, so that plant-based meat alternatives were perceived as the default to a greater extent, increased consumer selection of plant-based meat alternatives. Consumers' freedom of choice was preserved by leaving all choice options on the menu. An online experiment in The Netherlands showed that consumers choose plant-based meat alternatives more often relative to meat when the plant-based option is framed as the default. In a field experiment in a Dutch restaurant, we found that the amount of ordered plant-based meat alternative dishes substantially increased relative to an equivalent meat dish when implementing a default nudge (bean alternative: from 8.6% to 80.0%; seaweed alternative: from 16.1% to 58.3%). Thus, re-designing the menu in a way that suggests that plant-based meat alternatives are the default, while preserving autonomous decision-making, is a promising route to promote out-of-home adoption of plant-based meat alternatives in restaurants.

1. Introduction

Among multiple other studies, the EAT-Lancet Commission (Willett et al., 2019) has proposed that shifting diets towards a lower proportion of animal-based foods, and a higher proportion of diverse plant-based foods can significantly contribute to mitigating the environmental impact of food consumption in affluent societies. Such a dietary shift also has positive impacts on human health, animal welfare, and global food security.¹ Promising developments in this regard include the rise in the availability of plant-based meat alternatives (e.g., Curtain & Grafe-nauer, 2019) and the number of consumers who follow a flexitarian diet in the Western world (Dagevos, 2021). Despite such promising developments, flexitarians do not constitute a majority as yet (Dagevos, 2021), and plant-based meat alternatives remain relative niche products in Western markets (Clark & Bogdan, 2019; Joseph et al., 2020; Siegrist

& Hartmann, 2019). This indicates that a greater increase is needed in the consumer adoption of plant-based meat alternatives (i.e., protein-rich plant-based products that can be eaten as an alternative to meat, which include alternative proteins such as pulses, as well as plant-based meat substitutes; Onwezen et al., 2021), to tip the scale in the favor of more plant-rich dishes and diets.

A potentially impactful setting to target in this endeavor are out-of-home settings in the form of restaurants: many consumers in high-income countries increasingly consume meals out-of-home, and the proportion of meat that is consumed out-of-home is relatively high (Attwood et al., 2020; Dagevos & Reinders, 2018; Horgan et al., 2019; Reinders et al., 2017, 2020; Seburg et al., 2017). For instance, even a majority of German flexitarians state to choose meat more often in restaurant settings, relative to the home setting (Biermann & Rau, 2020). Conversely, German consumers view eating meat alternatives

* Corresponding author. Wageningen University and Research, Wageningen Economic Research, Wageningen, the Netherlands.

E-mail address: danny.taufik@wur.nl (D. Taufik).

¹ Note that, generally, plant-based foods are healthier than animal-based foods, but this does not mean that all plant-based meat alternatives necessarily have health benefits. For example, especially ultra-processed plant-based products could have an adverse effect on nutritional quality and healthiness of diets (Gehring et al., 2021; Satija et al., 2017). Also, plant-based meat alternatives may contain added sodium and some still may be relatively high in saturated fats (Alessandrini et al., 2021).

when dining out to be relatively inappropriate (Michel et al., 2021). Generally, in restaurants there is much to gain by promoting consumer adoption of plant-based meat alternatives to lower negative environmental impact caused by food consumption.²

1.1. Meat as the current default option in restaurants

A change in dietary habits towards higher consumption of plant-based meat alternatives can be hindered by meat being the go-to, default option in the minds of consumers. Given Westerners' strong level of meat attachment (Graça et al., 2015) and the perceived normalcy of the meatification of Western diets (Gray & Weis, 2021; Piazza et al., 2015), it can be argued that by default most consumers often choose meat without much deliberation (McBey et al., 2019). This is potentially further amplified by plant-based meat alternatives often being marketed as a direct alternative for meat (Weinrich, 2019), leading to consumers to mainly think about plant-based meat alternatives in terms of meat qualities (Hoek et al., 2011).

A choice option can be described as the default option when this option is in some way pre-selected (Johnson & Goldstein, 2003) and is therefore framed as the standard (Bergeron et al., 2019). When meat options have a more visible location on the menu (Kurz, 2018) or when a menu states that plant-based alternatives for meat are also available, but on request (Gravert & Kurz, 2021), this can strengthen the perception among consumers that meat is the default. By changing the default in the minds of consumers, behaviors that occur without much conscious deliberation can potentially be changed. This is a result of a change in cues in consumers' decision-making environment (Verplanken & Wood, 2006); overall, the food environment has been shown to be impactful in consumers' decision-making (for an overview, see Caspi et al., 2012; Taufik et al., 2019). Changing defaults can be an attractive option for policy makers to change consumer behavior, as defaults are relatively easy and low-cost to implement (Jachimowicz et al., 2019), while preserving consumers' freedom of choice (Li & Chapman, 2013).

1.2. Changing cues in restaurants to nudge food choices

Changing decisional cues through a default-type intervention can alter consumers' decision-making in restaurants (Meier et al., 2021; for an overview of nudging studies in restaurants, see Dagevos et al., forthcoming). A systematic review by Kwasny et al. (2022) found two studies that have examined effects of default interventions specifically in the context of meat consumption. First, Campbell-Arvai et al. (2014) showed that when restaurant patrons chose meat-free options more often after receiving a menu with only meat-free options, while the meat options are presented on a wall across the restaurant, as opposed to when meat-free and meat options were presented on one menu. Second, Friis et al. (2017) operationalized the default option differently through a pre-portioned, offered salad bowl in a canteen (default: 200 g of vegetables) which led to an increase in energy intake of vegetables relative to a control setting (self-serving buffet). In addition to these two studies, De Vaan et al. (2019) found that offering an all-vegetarian menu with the possibility to add meat to each dish increased uptake of vegetarian dishes, without provoking reactance.³ Also, a menu design which presented the vegetarian dish as the chef's recommendation increased the likelihood of choosing this vegetarian dish, though only among infrequent eaters of vegetarian foods (Bacon & Krpan, 2018). Similarly, Hansen et al. (2021) found that more vegetarian lunches were chosen

when the buffet was vegetarian by default. Consumers' food choices have also been successfully steered into plant-based directions in restaurants by increasing the number or proportion of vegetarian meal options offered (Garnett et al., 2019; Parkin & Attwood, 2022), or through modifying dishes by decreasing portion sizes of meat combined with increasing vegetables portions (Reinders et al., 2017; Spencer et al., 2021).

However, not all intervention studies in restaurants are successful to alter consumers' choices (see also Garnett et al., 2020). For example, Zhou et al. (2019) conducted an intervention amongst seniors where labelling the vegetarian option as the 'dish of the day' did not affect seniors' selections. Piester et al. (2020) provided patrons with sustainability and taste information about vegetarian options, which only altered plant-based selections (a veggie burger) among women. Also, Attwood et al. (2020) found no effect of a price-based decoy strategy on consumers' vegetarian or meat choices.

1.3. A reversal of the perceived default through a menu-based default nudge

To our knowledge, no empirical study has yet explored the potential effectiveness of implementing a menu-based default nudge that instigates a reversal of the default from animal-based to plant-based in a restaurant environment, specifically for plant-based meat alternatives. Though several studies have examined the effectiveness of a default-type nudge to promote choosing vegetarian instead of meat dishes (most notably Campbell-Arvai et al., 2014; Gravert and Kurz, 2021), these studies did not reveal whether consumers can be nudged towards specifically plant-based meat alternatives in a restaurant with a default nudge that leaves all choice options (including meat options) on a single menu. Such a use of a menu-based default nudge contributes to maximizing autonomous decision-making, prevent reactance among consumers and ultimately make it more likely that practitioners will actually implement a default nudge (Bruns & Perino, 2019). We propose that the relatively habitual manner in which consumers often choose meat in restaurants can be reversed by framing plant-based meat alternatives as the default, where the choice architecture in the form of the restaurant menu design is subtly changed in a way that suggests a pre-selection of a plant-based meat alternative. Hence, we hypothesize that:

H1. Implementing a default nudge on a restaurant menu that frames a plant-based meat alternative as the default 'opt-out' option increases consumer adoption of this plant-based meat alternative option, relative to a restaurant menu design where the equivalent meat option is framed as the default.

Default nudges are typically presumed to affect behavior relatively automatically, changing behavior that is based on more automatic processes, as is the case for nudging strategies in general (e.g., Marteau et al., 2011). Consumers' tendency to select a default option has been described as a form of intuitive decision-making; thus, selecting the default within a choice set becomes even more likely when consumers make decisions intuitively (Gigerenzer & Gaissmaier, 2011). White et al. (2021) showed that the effectiveness of a default nudge increases in situations with shorter decision times, which suggests that indeed default nudges are particularly effective when consumers make decisions more automatically. Consequently, implementing a default nudge to increase the selection of plant-based options might be particularly effective when this decision is primarily made based on intuition. There are potential individual differences in the extent to which consumers make decisions in an intuitive manner: consumers can by nature have a decision-making style that is relatively intuitive, relying primarily on intuition (Hamilton et al., 2016). If a default nudge indeed takes advantage of more automatic decision-making processes to be effective, then particularly consumers who by nature have a stronger intuitive decision-making style should be more susceptible to a

² Note that when discussing environmentally-friendly or environmental impacts, we refer to the sustainability of food, all other uses refer to environments in which consumers make their decisions, e.g. restaurants.

³ A motivational state that occurs when individuals' freedom is threatened, which can motivate them to do the exact opposite of what an appeal intended (Brehm & Brehm, 1981; de Vaan et al., 2019; Rains, 2013).

restaurant menu design in which the plant-based meat alternative is framed as the default. Hence, we hypothesize that:

H2. Implementing a default nudge that frames a plant-based meat alternative as the default ‘opt-out’ option, particularly leads to a higher adoption of a plant-based meat alternative among consumers with a relatively strong intuitive decision-making style.

1.4. Overview of studies

In the current studies, we test our first hypothesis for two forms of plant-based meat alternatives to get an idea of how robust and effective plant-based defaults are to increase selection of plant-based options: seaweed and pulses (bean) meat alternatives. Seaweed and pulses in the form of beans vary in consumer perception as a meat alternative, as consumers view seaweed as relatively innovative, more so than beans (Onwezen et al., 2019). Study 1 is an online study mimicking a restaurant setting, by means of a scenario. In Study 1 we also test our second hypothesis in which we examine the role of decision-making style in the effect of the default nudge on choices for a plant-based meat alternative (versus an equivalent meat option). Study 2 is a field experiment in a real-life restaurant, where the same two menu designs are tested to examine whether the default nudge increases actual, real-life consumer choices of a plant-based meat alternative, relative to choices for an equivalent meat option. This way, Study 2 also fulfills a need for more studies in real-life settings (e.g., Christie & Chen, 2018; Harguess et al., 2020) to examine how plant-based options can become the default in the perception of consumers (Rust et al., 2020).

2. Study 1 method

2.1. Participants

The study was conducted online in the Netherlands (September 2019), by using a consumer panel from a market research company. The final sample consisted of 800 study participants (49.6% male, 50.5% female), with an average age of $M = 46.3$ years ($SD = 16.0$; range 18–74 years), which is more than the sample size of 191 which was needed according to a power analysis performed with G*Power 3.1.9.7 (Faul et al., 2007) with the following input: statistical test = Goodness-of-fit tests; effect size $w = 0.25$; $\alpha = 0.05$; power $(1-\beta) = 0.8$; Df: 3. The estimated effect size used for the power analysis is based on previous default interventions which on average have a medium effect size (Jachimowicz et al., 2019). For recruitment of the participants, the instruction was given to the market research company that the study sample should be as representative as possible for the Dutch population in terms of sex, age, education level and income level. The study was approved by an Ethical Committee of a Dutch university.

2.2. Study procedure & design

The study had a between-subjects experimental design in which participants saw an online restaurant menu with a plant-based burger and a beef burger; they were randomly assigned to having either a bean burger or a seaweed burger as a plant-based option, in addition to the beef burger option. Furthermore, two designs of the menu were created (Fig. 1⁴). In one menu design, the beef burger was framed as a pre-selected ‘opt-out’ choice, which currently is relatively often the case in restaurants (‘Default Meat condition’). This was operationalized by having the beef burger on the menu, and in a separate frame next to the plant-based burger the following text was added: “Rather have a seaweed [bean] burger? This is also possible on request.” ($n^{\text{beans/default_meat}} = 186$, $n^{\text{seaweed/default_meat}} = 214$).

⁴ The original materials used for the studies were in Dutch; an English version of these materials was made to include in this manuscript.

Designs of the restaurant menus (Study 1)

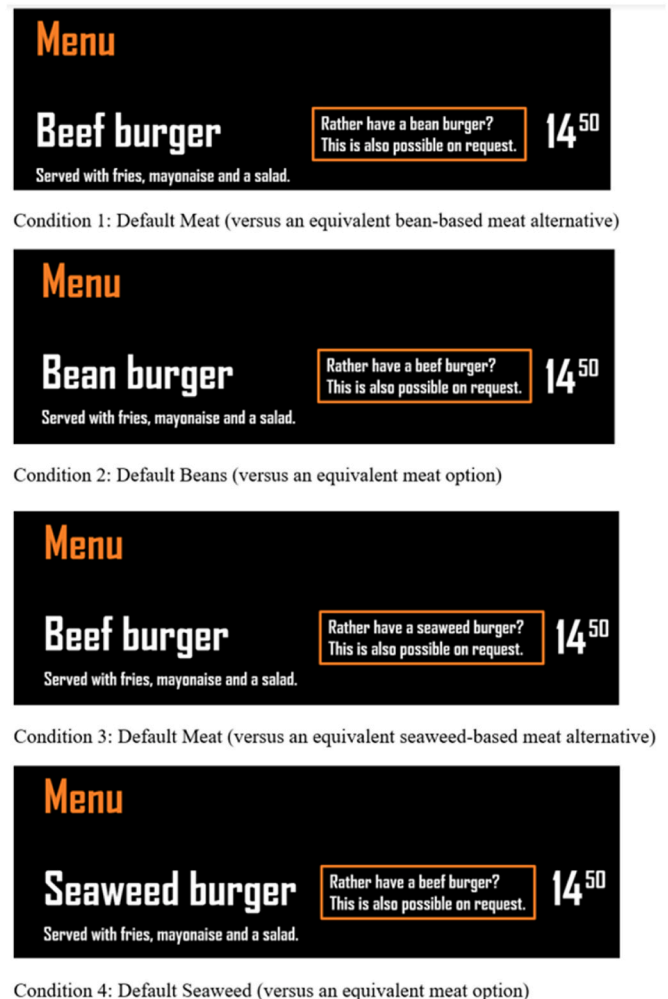


Fig. 1. Designs of the restaurant menus (Study 1).

In the other menu design the plant-based burger was framed as the pre-selected choice, in addition to a separate frame with the text (‘Default Seaweed [Beans] condition’): “Rather have a beef burger? This is also possible on request.” ($n^{\text{beans/default_beans}} = 184$, $n^{\text{seaweed/default_seaweed}} = 216$).

Participants first read the text, “Please imagine that you are ordering from a restaurant and see the following menu. On the menu, you see the following options for the main course.” Participants then saw one of the two menu designs, with either seaweed or beans as the plant-based option. This was followed by the question, “Which burger do you choose for your main course?” (the seaweed [bean] burger or the beef burger). Subsequently, participants answered the question, “In your experience, which of the two burgers was the more default option on the menu to choose as a main course” on a 1–7 Likert scale (1 = The seaweed [bean] burger was the default option on the menu, 7 = The beef burger was the default option on the menu). This was followed by questions that measured participants’ intuitive decision-making style, using the scale developed by Hamilton et al. (2016; e.g., “I make decisions based on intuition”, “My initial hunch about decisions is generally what I follow”, 1 = strongly disagree; 7 = strongly agree, Cronbach’s $\alpha = 0.87$). Finally, we asked whether participants had eaten seaweed [beans] before (yes/no), and if they answered this question with “yes” they were asked with which frequency they eat seaweed [beans]. This was followed by questions on socio-demographic characteristics.

3. Study 1 results

3.1. Manipulation check

First, we checked whether participants in the Default Seaweed [Beans] condition indeed perceived this plant-based meat alternative option as the default, more so than participants in the Default Meat condition. For the subsample of participants who had the bean burger as the plant-based option, an independent samples *t*-test showed that participants in the Default Beans condition indeed perceived the bean burger as being the default to a greater extent ($M = 3.87$, $SD = 2.46$), relative to participants in the Default Meat condition ($M = 5.85$, $SD = 1.71$); $t(368) = -8.99$, $p < .001$. Similarly, in the subsample of participants who had the seaweed burger as the plant-based option, participants in the Seaweed Default condition perceived the seaweed burger as the default to a greater extent ($M = 4.11$, $SD = 2.49$), relative to participants in the Default Meat condition ($M = 5.96$, $SD = 1.56$); $t(428) = -9.23$, $p < .001$. The average scores indicate that in absolute terms in the plant-based default conditions, the plant-based options are neither strongly seen as the default nor as the alternative (i.e. relatively neutral in terms of being the default); in relative terms, our manipulation worked as intended as the plant-based option was viewed as the default to a greater extent in the plant-based default conditions compared to the meat default conditions.

3.2. Effect of menu-default on adoption plant-based meat alternatives

We used a chi-squared test to test our hypothesis that framing a plant-based meat alternative option as the default 'opt-out' option on a restaurant menu increases consumer adoption of the plant-based meat alternative option, relative to an environment where meat is framed as the default on the menu (H_1). For the subsample of participants with the bean burger as a plant-based option, a chi-squared test showed that the proportion of plant-based burgers chosen (relative to meat) differed significantly between conditions: $\chi^2(1) = 4.52$, $p = .034$, Cramer's $V = 0.11$ (odds ratio = 0.613, 95% CI [0.39, 0.96]), in line with H_1 . Participants in the Default Beans condition chose the bean burger more often (34.2%) relative to participants in the Default Meat condition (24.2%; Fig. 2).

For the subsample of participants with the seaweed burger as a plant-based option, the proportion of burgers chosen did not significantly differ between participants in the Seaweed Default condition (30.6%) and participants in the Default Meat condition (23.1%); $\chi^2(1) = 2.82$, $p = .093$, Cramer's $V = 0.08$ (odds ratio = 0.693, 95% CI [0.45, 1.06]; Fig. 2), in contrast to H_1 .

To test whether participants' intuitive decision-making style affected the extent to which the menu design alters participants' choice of either the plant-based burger or beef burger, we used the SPSS PROCESS macro

(model 1; Hayes, 2012). For the subsample of participants with the seaweed burger as the plant-based meat alternative option, there was no significant interaction between the type of menu design and participants' level of intuitive decision-making style ($\beta = -0.15$, $z(3) = -0.68$, $p = .499$; see Table 1 for all statistics). There was also no significant interaction between the type of menu design and level of intuitive decision-making style ($\beta = 0.06$, $z(3) = 0.25$, $p = .806$; Table 1), for the subsample that had the bean burger as a plant-based meat alternative option, thus we found no support for H_2 .

4. Study 2 method

4.1. Study procedure & design

Study 2 was conducted in a restaurant in the Netherlands in September 2020 and also had a 2×2 between-subjects experimental design. Every week we tweaked the main dish (a wrap) of the 'menu of the month', which is one of the items on the restaurants' menu, by changing the default (meat vs. plant-based) and by changing the type of plant-based meat alternative (beans vs. seaweed). The first week (Week 1) the main dish on the 'menu of the month' was a chicken wrap and below in smaller italic text the following was added: "Rather have a beans wrap? This is also possible on request." (Default Meat). In the second week (Week 2) this was reversed (Default Beans). In the third (Week 3; Default Meat) and fourth week (Week 4; Default Seaweed) this was repeated, but with a seaweed wrap as the plant-based meat alternative instead of a beans wrap (Fig. 3).

After restaurant visitors finished their main course, the staff asked them to complete a survey either online or on paper. All visitors, also those who did not order the 'menu of the month' were asked to complete the survey. Visitors had the possibility to receive one of 10 dining checks worth €41 that would be divided among the participants, as an incentive

Table 1
Results of moderation analysis intuitive decision-making style (Study 1).

	Proportion plant-based (beans) vs. animal-based dishes chosen				Proportion plant-based (seaweed) vs. animal-based dishes chosen			
	β	SE	z	p	β	SE	z	p
Type of menu design	-.48	.23	-2.04	.041	-.46	.22	-.166	.098
Intuitive decision-making style	-.26	.55	-.47	.641	.27	.56	.48	.628
Type of menu design x Intuitive decision-making style	.06	.22	.25	.806	-.15	.22	-.68	.499

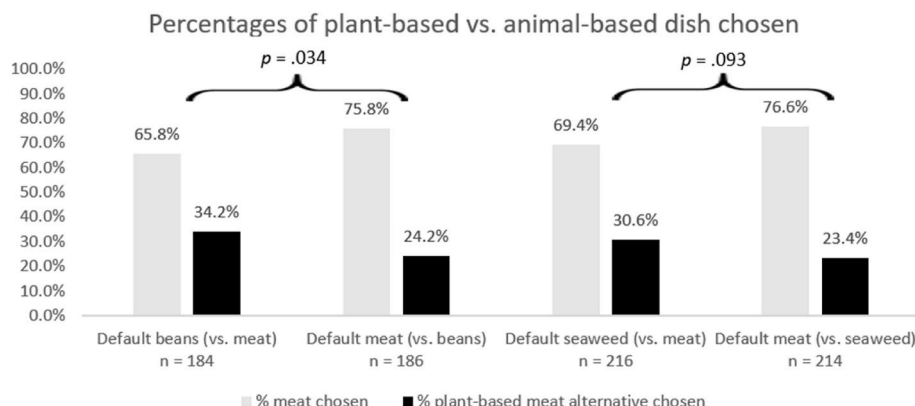


Fig. 2. Percentages of plant-based versus animal-based dish chosen per type of restaurant menu design (Study 1: online study).



Note. The text on the menus was translated to English for this manuscript. The original text was in Dutch.

Fig. 3. Designs of the restaurant menus (Study 2)

Note. The text on the menus was translated to English for this manuscript. The original text was in Dutch.

to complete the survey. The survey included a manipulation check where participants were asked, “In your experience, which of the two wraps was the default option on the menu?” (richly filled wrap with beans[seaweed] or richly filled wrap with chicken) and “Did you notice that there was an alternative option besides the default option?” (yes/no). The survey ended with socio-demographical questions.

4.2. Participants

The restaurant received 1653 visitors in September 2020 (Week 1: 391, Week 2: 398, Week 3: 384, Week 4: 480), of which 127 visitors ordered the main dish from the ‘menu of the month’ (Week 1: 35, Week 2: 25, Week 3: 31, Week 4: 36). This sample size of 127 visitors is slightly less than the needed sample size of 191 participants according to a similar power analysis as in Study 1 performed with G*Power 3.1.9.7,

with the following input: statistical test = Goodness-of-fit tests; effect size $w = 0.25$; $\alpha = 0.05$; power $(1-\beta) = 0.8$; Df: 3. The ‘menu of the month’ was the most ordered item on the menu during our study, which is normally also the case in the restaurant. In total, 294 visitors started to complete the questionnaire; 24 entries were excluded from analysis because they were incomplete. This resulted in 270 visitors who completed the entire questionnaire (sex: 50.4% female, 48.9% male; age_{years}: $M = 40.4$, $SD = 16.6$, range = 12–78); 29 (Week 1: 13, Week 2: 2, Week 3: 3, Week 4: 11) of these 270 visitors ordered the main dish from the ‘menu of the month’ (sex: 55.2% female, 44.8% male; age_{years}: $M = 37.5$, $SD = 15.1$). The study was approved by an Ethical Committee of a Dutch university.

5. Study 2 results

5.1. Manipulation check

Due to a small number of patrons that completed the survey ($N = 29$ visitors who ordered the main dish from the 'menu of the month', and also completed the survey) we could not analyze whether the default on the menu design was indeed actually perceived significantly more as the default option, rather than the alternative that was on the menu for the different weeks. We therefore calculated a variable that indicated whether participants correctly answered that a certain wrap (plant-based meat alternative or meat) was the default or not in the respective week. Descriptive analysis showed that 86.2% correctly indicated the default wrap as being the default and 13.8% indicated the alternative wrap as being the default. Moreover, 82.8% of participants indicated that they noticed that there was an alternative option next to the default option and 17.2% did not notice this. This descriptive analysis suggests that the option that was framed as the default was perceived as such by patrons, while the large majority of patrons also noticed the alternative choice option.

5.2. Effect of menu-default on adoption plant-based meat alternatives

Similar to Study 1, we used a chi-squared test to test H_1 . For the participants who had the beans wrap as a plant-based option, a chi-squared test showed that the proportion of plant-based versus meat wraps chosen differed significantly between conditions: $\chi^2(1) = 31.48$, $p < .001$, Cramer's $V = 0.72$ (odds ratio = 0.023, 95% CI [0.005, 0.109]), in line with H_1 . Participants in the Default Beans condition (Week 2) chose the beans wrap more often (80.0%) relative to participants in the Default Meat condition (Week 1; 8.6%), see Fig. 4.

For the participants who had the seaweed burger as a plant-based option, the proportion of plant-based versus meat wraps chosen also differed significantly between conditions: $\chi^2(1) = 12.49$, $p < .001$, Cramer's $V = 0.43$ (odds ratio = 0.137, 95% CI [0.043, 0.440]), in line with H_1 . Participants in the Default Seaweed condition (Week 4) chose the seaweed wrap more often (58.3%) relative to participants in the Default Meat condition (Week 3; 16.1%; Fig. 4).

6. Discussion

Significant strides can be made in making consumers' lives more sustainable and healthy by promoting adoption of plant-based meat alternatives. This is particularly the case in out-of-home, restaurant settings, where the level of meat consumption is relatively high. Our studies demonstrate that consumers' tendency to eat meat while dining out can be countered by subtly re-designing the menu in a way that frames the plant-based option as the default, while preserving autonomous decision-making by leaving all options (including the equivalent meat dish) on the menu. When a bean-based meat alternative was presented as the plant-based option, the default nudge was effective in both an online study and a field experiment. It should be noted that in the online study the percentage of participants choosing the bean-based meat alternative was, even in the Default Beans condition, rather low in terms of absolute percentages (34.2% in the Default Beans condition). This indicates that, even though a default nudge significantly increases the amount of bean-based meat alternatives chosen, the amount of consumers choosing meat still remained high in absolute terms in the online study. However, this was not seen in the real-life study, where the vast majority chose the bean-based meat alternative when this option was framed as the default in the menu design (80.0%). Differences between the online and real-life study results are also visible with regard to the Default Seaweed condition. When consumers were presented with a seaweed meat alternative, the re-designed menu led to a higher adoption of the seaweed meat alternative in the real-life restaurant setting (Study 2), but not online (Study 1). One potential explanation is the variation in

the strength of the default nudge between the studies, with the real-life study having a stronger default nudge than the online study: in the online study, consumers always had to make an active choice for the plant-based meat alternative, or the equivalent meat option, while in the real-life study, a selection was also made even if restaurant visitors did not make an active choice: the visitor received whichever dish was the default that week. This was also visible in the effect size of the default nudge being larger in the real-life study, compared to the effects found in the online study. Studies that examined the overall effectiveness of default-type interventions indicated that the effect size of default interventions varies widely, both in general (Jachimowicz et al., 2019) and specifically in the context of reducing meat consumption (Meier et al., 2021). On average, the effect size of implementing a default nudge is medium-sized (Jachimowicz et al., 2019). The effect size (Cramer's V) of our studies can be characterized as small in Study 1, and large in Study 2, based on common effect size interpretations (Serdar et al., 2021). This is in line with the variation in effect size across default studies (Meier et al., 2021), as well as the average effect size being medium-sized (Jachimowicz et al., 2019).

Furthermore, implementing a default nudge to promote a seaweed meat alternative overall tended to be less effective than to promote a bean-based meat alternative, though inspection of the degree of overlap of confidence intervals⁵ showed that this difference was only significant in Study 2. Food neophobia could explain these differences, as it is found to reduce consumers' willingness to consume seaweed (Losada-Lopez et al., 2021). Seaweed is a quite new food product in Western countries (Van den Burg et al., 2021), and therefore likely not easily accepted (yet) by consumers. Jachimowicz et al. (2019) reason that defaults are less likely to influence consumers if they have a strong preference within a choice set. Thus, a seaweed meal-option as the default might be less effective because people have a stronger preference for meat relative to seaweed when these are the choice options, more so than the difference between beans relative to meat. We note that this explanation should be cautiously interpreted given that Study 1 showed no significant difference in the default effectiveness between bean-based and seaweed-based meat alternatives.

Furthermore, Study 1 showed that individuals' decision-making style (i.e., how intuitively they make decisions by nature) did not moderate the effect of the default nudge on consumers' plant-based selections, suggesting that a default nudge does not necessarily take advantage of (only) automatic processes. Although ex ante not expected, we found this to be in line with findings of Van Gestel et al. (2020) who showed that default nudges affect sustainable actions (in the form of the number of green amenities chosen) in contexts with either a high or low cognitive load. This indicates that availability of cognitive resources does not automatically alter the effectiveness of default nudges to change behavior, again suggesting that a default nudge does not solely take advantage of automatic processes to alter decision-making.

Our studies also provide a potential explanation for variance in the overall effectiveness of default nudges (for an overview, see Jachimowicz et al., 2019) in the form of the strength of the default nudge: in our real-life study, when a choice was also made if consumers did not make an active choice, the effectiveness of the default nudge was larger than in our online study where an active choice always needed to be made. Additionally, little is known about the potential underlying mechanism regarding default effectiveness. Jachimowicz et al. (2019) posit several potential mechanisms: the default represents either a trusted recommendation (endorsement), the status quo (endowment), or an easier choice (ease). Loss aversion, social norms and personal norms have also been viewed as potential mechanisms explaining the effectiveness of

⁵ The procedure of Julious (2004) and Cumming (2009) was followed which determines that the overlap between 95% CI's should be less than a half the length of one arm, to state that the predictive ability of one factor is significantly greater than of a different factor.

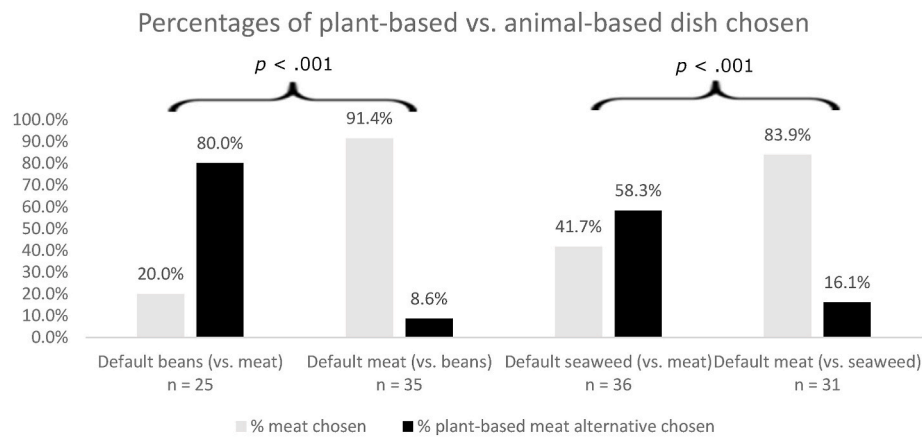


Fig. 4. Percentages of plant-based versus animal-based dish chosen per type of restaurant menu design (Study 2: real-life, restaurant study).

defaults (Kaiser et al., 2020). In a real-life restaurant setting, where Study 2 was conducted, the endorsement and endowment mechanisms could have been strengthened because consumers perceive the restaurant to endorse the pre-selected choice or that consumers perceive the default choice as the status quo in that restaurant. In other settings, such as in our online study (Study 1), strengthening this endorsement or endowment mechanism might be more difficult to achieve. More insight in these underlying mechanisms can contribute to explain under which conditions a default nudge is particularly effective.

The current work extends previous research that provided initial evidence that reversing the default from animal-based to plant-based via a subtle re-design of a restaurant menu can be effective. Particularly the studies of Campbell-Arvai et al. (2014) and Gravert and Kurz (2021) are also targeted towards explicitly changing the default to promote plant-based food consumption, while Mertens et al. (2022) conclude that nudges have a particularly strong effect on behavior in the food domain, with default nudges being identified as a particularly effective type of nudge. Our work adds to the literature in several ways: first, we implemented a menu-based default nudge in a way that leaves both plant-based and equivalent meat options on the same menu thus preserving freedom of choice even more so than previous uses of a default nudge; the default strategy of Campbell-Arvai et al. (2014) placed meat options on a separate menu across the restaurant, while Gravert and Kurz (2021) did not explicitly describe the alternative choice option. Second, we focused specifically on plant-based meat alternatives rather than more generic vegetarian options that are vastly different from the meat options (e.g., a beef burger versus a vegetable risotto). In addition, we also tested our default manipulation in a real-life restaurant where substantial effects were found on increasing consumer adoption of plant-based meat alternatives. Given the characteristic of plant-based meat alternatives remaining relatively niche products, and the potential struggle of meat alternatives to encounter more automatic tendencies to eat meat, a default nudge can significantly boost consumption of plant-based meat alternatives.

6.1. Future research and study limitations

The current work brings forward a number of future research options, and some study limitations. First, in our studies we operationalized plant-based meat alternatives in terms of bean-based and seaweed-based meat alternatives. This leads to the question how effective a default nudge is for other plant-based meat alternatives, or relatively sustainable non-plant-based meat alternatives such as insects. For instance, insects have a low level of consumer acceptance, compared to both meat and plant-based options (Onwezen et al., 2021). Consequently, one might expect consumers to have a relatively strong preference for meat over insect-based meat alternatives within a choice set.

Based on the reasoning of Jachimowicz et al. (2019) that defaults are less effective if consumers have a strong preference within a choice set, it would be expected that framing insect-based meat alternatives as the default on a restaurant menu would be less effective relative to plant-based meat alternatives which have a higher baseline level of consumer acceptance. Future research can test the role of this baseline level of consumer acceptance of plant-based meat alternatives in the effectiveness of a default nudge in restaurants. Second, in our studies we did not examine the underlying mechanism of why implementing a default nudge that reverses the default from animal-based to plant-based on a restaurant menu is effective. Future research can examine potential underlying mechanisms, such as endorsement, endowment and ease (Jachimowicz et al., 2019). This can for instance be operationalized by explicitly adding a chef's endorsement on the restaurant menu, similar to the study of Bacon and Krpan (2018), in combination with framing the plant-based meat substitute option as the default as in our current studies. Third, our online study was based on the scenario of an offline, brick-and-mortar restaurant, but in many countries consumers increasingly also order food online (e.g., Keeble et al., 2020). Future research can examine to what extent framing plant-based meat alternatives as the default in such online, home delivery contexts is effective in increasing the adoption of plant-based meat alternatives. Given that food prepared for home delivery is overall relatively unhealthy (Keeble et al., 2020; Poelman et al., 2020), this can contribute to more healthy food decisions by consumers who order food online. Fourth, Study 2 was slightly underpowered in terms of sample size. However, due to practical field study limitations (i.e., we were only able to conduct the study in the restaurant for a limited agreed upon number of weeks), this final sample size was what was possible in terms of practical feasibility. Given the relatively large effect size that we found in Study 2, the findings are still likely to be relatively robust. To verify the robustness of the findings, a future comparable study could aim for a larger sample size to increase the study's statistical power. Finally, in Study 2 only a limited amount of patrons completed the survey, so that we could only descriptively check whether most patrons noticed both the default and alternative option on the menu. Though this descriptive analysis suggested that the majority of patrons noticed the alternative option, follow-up research can further examine whether consumers indeed notice both options when one option is framed as the default, using a larger sample size.

6.2. Conclusions

From both an environmental and a health perspective, much can be gained if consumers – first and foremost in the world's wealthiest countries – would proportionally eat less meat and more plant-based foods, such as plant-based meat alternatives. This is particularly the case in restaurants where overall meat consumption is relatively high.

The current studies demonstrate how a low-cost, easy to implement default nudge which preserves consumers' freedom of choice, increases the proportion of plant-based meat alternatives adopted relative to equivalent meat options in a restaurant. Thus, a subtle re-design of the menu can already make plant-based meat alternatives the default in the minds of consumers, contributing to making plant-based meat alternatives a more often chosen dish in out-of-home, restaurant settings. As a consequence, a reversal of defaults can facilitate the reversing of the meatification of diets and help the re-meatification - i.e. the substitution of meat for plant-based meat alternatives – of diets.

Data sharing statement

The anonymous dataset is available from the authors, upon reasonable request.

Ethical statement

The studies were reviewed and approved by the Social Sciences Ethics Committee of Wageningen University & Research, and comply with the Netherlands Code of Conduct for Research Integrity.

CRediT authorship contribution statement

Danny Taufik: Conceptualization, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. Emily P. Bouwman: Conceptualization, Methodology, Formal analysis, Writing – review & editing. Machiel J. Reinders: Conceptualization, Methodology, Writing – review & editing. Hans Dagevos: Conceptualization, Writing – review & editing.

Declaration of competing interest

None.

Acknowledgements

The reported studies were part of a project funded by the Dutch Ministry of Agriculture, Nature and Food Quality. The authors would also like to thank the restaurant H41 in Wageningen (The Netherlands) for providing the opportunity to conduct Study 2 in their restaurant.

References

- Alessandrini, R., Brown, M. K., Pombo-Rodrigues, S., Bhageerutty, S., He, F. J., & MacGregor, G. A. (2021). Nutritional quality of plant-based meat products available in the UK: A cross-sectional survey. *Nutrients*, 13(12), 4225. <https://doi.org/10.3390/nu13124225>
- Attwood, S., Chesworth, S. J., & Parkin, B. L. (2020). Menu engineering to encourage sustainable food choices when dining out: An online trial of priced-based decoys. *Appetite*, 149, 104601. <https://doi.org/10.1016/j.appet.2020.104601>
- Bacon, L., & Krpan, D. (2018). (Not) Eating for the environment: The impact of restaurant menu design on vegetarian food choice. *Appetite*, 125, 190–200. <https://doi.org/10.1016/j.appet.2018.02.006>
- Bergeron, S., Doyon, M., Saulais, L., & Labrecque, J. (2019). Using insights from behavioral economics to nudge individuals towards healthier choices when eating out: A restaurant experiment. *Food Quality and Preference*, 73, 56–64. <https://doi.org/10.1016/j.foodqual.2018.12.001>
- Biermann, G., & Rau, H. (2020). In *The meaning of meat: (Un)sustainable eating practices at home and out of home* (p. 104730). *Appetite*. <https://doi.org/10.1016/j.appet.2020.104730>
- Brehm, S. S., & Brehm, J. W. (1981). *Psychological reactance: A theory of freedom and control*. New York, NY: Academic Press.
- Bruns, H., & Perino, G. (2019). *The role of autonomy and reactance for nudging: experimentally comparing defaults to recommendations and mandates*. <https://doi.org/10.2139/ssrn.3442465>. Available at.
- Campbell-Arvai, V., Arvai, J., & Kalof, L. (2014). Motivating sustainable food choices: The role of nudges, value orientation, and information provision. *Environment and Behavior*, 46(4), 453–475. <https://doi.org/10.1177/0013916512469099>
- Caspi, C. E., Sorensen, G., Subramanian, S. V., & Kawachi, I. (2012). The local food environment and diet: A systematic review. *Health & Place*, 18(5), 1172–1187. <https://doi.org/10.1016/j.healthplace.2012.05.006>
- Christie, C. D., & Chen, F. S. (2018). Vegetarian or meat?: Food choice modeling of main dishes occurs outside of awareness. *Appetite*, 121, 50–54. <https://doi.org/10.1016/j.appet.2017.10.036>
- Clark, L. F., & Bogdan, A. M. (2019). Plant-based foods in Canada: Information, trust and closing the commercialization gap. *British Food Journal*, 121(10), 2535–2550. <https://doi.org/10.1108/BFJ-12-2018-0826>
- Cumming, G. (2009). Inference by eye: Reading the overlap of independent confidence intervals. *Statistics in Medicine*, 28(2), 205–220. <https://doi.org/10.1002/sim.3471>
- Curtain, F., & Grafenauer, S. (2019). Plant-based meat substitutes in the flexitarian age: An audit of products on supermarket shelves. *Nutrients*, 11(11), 2603. <https://doi.org/10.3390/nu11112603>
- Dagevos, H. (2021). Finding flexitarians: Current studies on meat eaters and meat reducers. *Trends in Food Science & Technology*, 114, 530–539. <https://doi.org/10.1016/j.tifs.2021.06.021>
- Dagevos, H., & Reinders, M. J. (2018). Flexitarianism and social marketing: Reflections on eating meat in moderation. In D. Bogueva, D. Marinova, & T. Raphaely (Eds.), *Handbook of research on social marketing and its influence on animal origin food product consumption* (pp. 105–120). IGI Global.
- Dagevos, H., Taufik, D., Reinders, M. J., Rood, R., & Bouwman, E. P. (2022). The power of behavioural nudges tailored to plant-based dishes when eating out (in press). In G. Bartella, & C. Santini (Eds.), *Plant-based food consumption: Products, consumers and strategies*. Amsterdam: Elsevier.
- Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G* Power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, 39(2), 175–191. <https://doi.org/10.3758/BF03193146>
- Friis, R., Skov, L. R., Olsen, A., Appleton, K. M., Saulais, L., Dinnella, C., Hartwell, H., Depey, L., Monteleone, E., Giboreau, A., & Perez-Cueto, F. J. (2017). Comparison of three nudge interventions (priming, default option, and perceived variety) to promote vegetable consumption in a self-service buffet setting. *PLoS One*, 12(5), Article e0176028. <https://doi.org/10.1371/journal.pone.0176028>
- Garnett, E. E., Balmford, A., Sandbrook, C., Pilling, M. A., & Marteau, T. M. (2019). Impact of increasing vegetarian availability on meal selection and sales in cafeterias. *Proceedings of the National Academy of Sciences*, 116, 20923–20929. <https://doi.org/10.1073/pnas.1907207116>
- Garnett, E. E., Marteau, T. M., Sandbrook, C., Pilling, M. A., & Balmford, A. (2020). Order of meals at the counter and distance between options affect student cafeteria vegetarian sales. *Nature Food*, 1, 485–488. <https://doi.org/10.1038/s43016-020-0132-8>
- Gehring, J., Touvier, M., Baudry, J., Julia, C., Buscail, C., Srour, B., Hercberg, S., Péneau, S., Kesse-Guyot, E., & Allès, B. (2021). Consumption of ultra-processed foods by pesco-vegetarians, vegetarians, and vegans: Associations with duration and age at diet initiation. *Journal of Nutrition*, 151(1), 120–131. <https://doi.org/10.1093/jn/nxaa196>
- Gigerenzer, G., & Gaissmaier, W. (2011). Heuristic decision making. *Annual Review of Psychology*, 62, 451–482. <https://doi.org/10.1146/annurev-psych-120709-145346>
- Graça, J., Calheiros, M. M., & Oliveira, A. (2015). Attached to meat?: (Un)Willingness and intentions to adopt a more plant-based diet. *Appetite*, 95, 113–125. <https://doi.org/10.1016/j.appet.2015.06.024>
- Gravert, C., & Kurz, V. (2021). Nudging à la carte: A field experiment on climate-friendly food choice. *Behavioural Public Policy*, 3, 1–18. <https://doi.org/10.1017/bpp.2019.11>
- Gray, A., & Weis, T. (2021). *The meatification and re-meatification of diets: The unequal burden of animal flesh and the urgency of plant-meat alternatives*. Tiny Beam Fund.
- Hamilton, K., Shih, S. I., & Mohammed, S. (2016). The development and validation of the rational and intuitive decision styles scale. *Journal of Personality Assessment*, 98(5), 523–535. <https://doi.org/10.1080/00223891.2015.1132426>
- Hansen, P. G., Schilling, M., & Maltesen, M. S. (2021). Nudging healthy and sustainable food choices: Three randomized controlled field experiments using a vegetarian lunch- default as a normative signal. *Journal of Public Health*, 43(2), 392–397. <https://doi.org/10.1093/pubmed/fdz154>
- Harguass, J. M., Crespo, N. C., & Hong, M. Y. (2020). Strategies to reduce meat consumption: A systematic literature review of experimental studies. *Appetite*, 144, 104478. <https://doi.org/10.1016/j.appet.2019.104478>
- Hayes, A. F. (2012). Process: A versatile computational tool for observed variable mediation, moderation, and conditional process modeling [White paper] <http://www.afhayes.com/>
- Hoek, A. C., van Boekel, M. A., Voordouw, J., & Luning, P. A. (2011). Identification of new food alternatives: How do consumers categorize meat and meat substitutes? *Food Quality and Preference*, 22(4), 371–383. <https://doi.org/10.1016/j.foodqual.2011.01.008>
- Horgan, G. W., Scalco, A., Craig, T., Whybrow, S., & Macdiarmid, J. I. (2019). Social, temporal and situational influences on meat consumption in the UK population. *Appetite*, 138, 1–9. <https://doi.org/10.1016/j.appet.2019.03.007>
- Jachimowicz, J. M., Duncan, S., Weber, E. U., & Johnson, E. J. (2019). When and why defaults influence decisions: A meta-analysis of default effects. *Behavioural Public Policy*, 3(2), 159–186. <https://doi.org/10.1017/bpp.2018.43>
- Johnson, E. J., & Goldstein, D. (2003). Do defaults save lives? *Science*, 302, 1338–1339. <https://doi.org/10.1126/science.1091721>
- Joseph, P., Searing, A., Watson, C., & McKeague, J. (2020). Alternative proteins: Market research on consumer trends and emerging landscape. *Meat and Muscle Biology*, 4(2). <https://doi.org/10.22175/mmb.11225>
- Julious, S. A. (2004). Using confidence intervals around individual means to assess statistical significance between two means. *Pharmaceutical Statistics: The Journal of Applied Statistics in the Pharmaceutical Industry*, 3(3), 217–222. <https://doi.org/10.1002/pst.126>

- Kaiser, M., Bernauer, M., Sunstein, C. R., & Reisch, L. A. (2020). The power of green defaults: The impact of regional variation of opt-out tariffs on green energy demand in Germany. *Ecological Economics*, 174, 106685. <https://doi.org/10.1016/j.ecolecon.2020.106685>
- Keeble, M., Adams, J., Sacks, G., Vanderlee, L., White, C. M., Hammond, D., & Burgoine, T. (2020). Use of online food delivery services to order food prepared away-from-home and associated sociodemographic characteristics: A cross-sectional, multi-country analysis. *International Journal of Environmental Research and Public Health*, 17(14), 5190. <https://doi.org/10.3390/ijerph17145190>
- Kurz, V. (2018). Nudging to reduce meat consumption: Immediate and persistent effects of an intervention at a university restaurant. *Journal of Environmental Economics and Management*, 90, 317–341. <https://doi.org/10.1016/j.jeem.2018.06.005>
- Kwasny, T., Dobernig, K., & Riefler, P. (2022). Towards reduced meat consumption: A systematic literature review of intervention effectiveness, 2001–2019. *Appetite*, 168, 105739. <https://doi.org/10.1016/j.appet.2021.105739>
- Li, M., & Chapman, G. B. (2013). Nudge to health: Harnessing decision research to promote health behavior. *Social and Personality Psychology Compass*, 7(3), 187–198. <https://doi.org/10.1111/spc3.12019>
- Losada-Lopez, C., Dopico, D. C., & Faina-Medin, J. A. (2021). Neophobia and seaweed consumption: Effects on consumer attitude and willingness to consume seaweed. *International Journal of Gastronomy and Food Science*, 24, 100338. <https://doi.org/10.1016/j.ijgfs.2021.100338>
- Marteau, T. M., Ogilvie, D., Roland, M., Suhrcrke, M., & Kelly, M. P. (2011). Judging nudging: Can nudging improve population health? *BMJ*, 342. <https://doi.org/10.1136/bmj.d228>
- McBey, D., Watts, D., & Johnstone, A. M. (2019). Nudging, formulating new products, and the lifecycle: A qualitative assessment of the viability of three methods for reducing scottish meat consumption for health, ethical, and environmental reasons. *Appetite*, 142, 104349. <https://doi.org/10.1016/j.appet.2019.104349>
- Meier, J., Andor, M. A., Doebbe, F., Haddaway, N., & Reisch, L. A. (2021). Can green defaults reduce meat consumption?. <https://doi.org/10.2139/ssrn.3903160>. Available at SSRN: <https://ssrn.com/abstract=3903160>.
- Mertens, S., Herberz, M., Hahnel, U. J. J., & Brosch, T. (2022). The effectiveness of nudging: A meta-analysis of choice architecture interventions across behavioral domains. *Proceedings of the National Academy of Sciences*, 119, Article e2107346118. <https://doi.org/10.1073/pnas.2107346118>
- Michel, F., Hartmann, C., & Siegrist, M. (2021). Consumers' associations, perceptions and acceptance of meat and plant-based meat alternatives. *Food Quality and Preference*, 87, 104063. <https://doi.org/10.1016/j.foodqual.2020.104063>
- Onwezen, M. C., Bouwman, E. P., Reinders, M. J., & Dagevos, H. (2021). A systematic review on consumer acceptance of alternative proteins: Pulses, algae, insects, plant-based meat alternatives, and cultured meat. *Appetite*, 159, 105058. <https://doi.org/10.1016/j.appet.2020.105058>
- Onwezen, M. C., Van den Puttelaar, J., Verain, M. C. D., & Veldkamp, T. (2019). Consumer acceptance of insects as food and feed: The relevance of affective factors. *Food Quality and Preference*, 77, 51–63. <https://doi.org/10.1016/j.foodqual.2019.04.011>
- Parkin, B. L., & Attwood, S. (2022). Menu design approaches to promote sustainable vegetarian food choices when dining out. *Journal of Environmental Psychology*, 79, 101721. <https://doi.org/10.1016/j.jenvp.2021.101721>
- Piazza, J., Ruby, M. B., Loughnan, S., Luong, M., Kulik, J., Watkins, H. M., & Seigerman, M. (2015). Rationalizing meat consumption. The 4Ns. *Appetite*, 91, 114–128. <https://doi.org/10.1016/j.appet.2015.04.011>
- Piester, H. E., DeRieux, C. M., Tucker, J., Buttrick, N. R., Galloway, J. N., & Wilson, T. D. (2020). "I'll try the veggie burger": Increasing purchases of sustainable foods with information about sustainability and taste. *Appetite*, 155, 104842. <https://doi.org/10.1016/j.appet.2020.104842>
- Poelman, M. P., Thornton, L., & Zenk, S. N. (2020). A cross-sectional comparison of meal delivery options in three international cities. *European Journal of Clinical Nutrition*, 74(10), 1465–1473. <https://doi.org/10.1038/s41430-020-0630-7>
- Rains, S. A. (2013). The nature of psychological reactance revisited: A meta-analytic review. *Human Communication Research*, 39(1), 47–73. <https://doi.org/10.1111/j.1468-2958.2012.01443.x>
- Reinders, M. J., Huitink, M., Dijkstra, S. C., Maaskant, A. J., & Heijnen, J. (2017). Menu-engineering in restaurants-adapting portion sizes on plates to enhance vegetable consumption: A real-life experiment. *International Journal of Behavioral Nutrition and Physical Activity*, 14(1), 41. <https://doi.org/10.1186/s12966-017-0496-9>
- Reinders, M. J., van Lieshout, L., Pot, G. K., Neufingerl, N., van den Broek, E., Battjes-Fries, M., & Heijnen, J. (2020). Portioning meat and vegetables in four different out of home settings: A win-win for guests, chefs and the planet. *Appetite*, 147, 104539. <https://doi.org/10.1016/j.appet.2019.104539>
- Rust, N. A., Ridding, L., Ward, C., Clark, B., Kehoe, L., Dora, M., Whittingham, M. J., McGowan, P., Chaudhary, A., Reynolds, C. J., Trivedy, C., & West, N. (2020). How to transition to reduced-meat diets that benefit people and the planet. *The Science of the Total Environment*, 718, 137208. <https://doi.org/10.1016/j.scitotenv.2020.137208>
- Satija, A., Bhupathiraju, S. N., Spiegelman, D., Chiuve, S. E., Manson, J. E., Willett, W., Rexrode, K. M., Rimm, E. B., & Hu, F. B. (2017). Healthful and unhealthful plant-based diets and the risk of coronary heart disease in U.S. adults. *Journal of the American College of Cardiology*, 70(4), 411–422. <https://doi.org/10.1016/j.jacc.2017.05.047>
- Seburg, E. M., Crane, M. M., & Sherwood, N. E. (2017). Behavioral risk factors for overweight and obesity: Diet and physical activity. In *Nutrition in the prevention and treatment of disease* (pp. 515–537). Academic Press.
- Serdar, C. C., Cihan, M., Yücel, D., & Serdar, M. A. (2021). Sample size, power and effect size revisited: Simplified and practical approaches in pre-clinical, clinical and laboratory studies. *Biochimica Medica*, 31(1), 27–53. <https://doi.org/10.11613/BM.2021.010502>
- Siegrist, M., & Hartmann, C. (2019). Impact of sustainability perception on consumption of organic meat and meat substitutes. *Appetite*, 132, 196–202. <https://doi.org/10.1016/j.appet.2018.09.016>
- Spencer, M., Rowe, S., Bonnell, C., & Dalton, P. (2021). Consumer acceptance of plant-forward recipes in a natural consumption setting. *Food Quality and Preference*, 88, 104080. <https://doi.org/10.1016/j.foodqual.2020.104080>
- Taufik, D., Verain, M. C., Bouwman, E. P., & Reinders, M. J. (2019). Determinants of real-life behavioural interventions to stimulate more plant-based and less animal-based diets: A systematic review. *Trends in Food Science & Technology*, 93, 281–303. <https://doi.org/10.1016/j.tifs.2019.09.019>
- de Vaan, J. M., van Steen, T., & Müller, B. C. N. (2019). Meat on the menu?: How the menu structure can stimulate vegetarian choices in restaurants. *Journal of Applied Social Psychology*, 49(12), 755–766. <https://doi.org/10.1111/jasp.12632>
- Van Gestel, L. C., Adriaanse, M. A., & De Ridder, D. T. D. (2020). Do nudges make use of automatic processing? Unraveling the effects of a default nudge under type 1 and type 2 processing. *Comprehensive Results in Social Psychology*, 1–21. <https://doi.org/10.1080/23743603.2020.1808456>
- Van den Burg, S. W. K., Dagevos, H., & Helmes, R. J. K. (2021). Towards sustainable European seaweed value chains: A triple P perspective. *ICES Journal of Marine Science*, 78(1), 443–450. <https://doi.org/10.1093/icesjms/fsz183>
- Verplanken, B., & Wood, W. (2006). Interventions to break and create consumer habits. *Journal of Public Policy and Marketing*, 25(1), 90–103. <https://doi.org/10.1509/jppm.25.1.90>
- Weinrich, R. (2019). Opportunities for the adoption of health-based sustainable dietary patterns: A review on consumer research of meat substitutes. *Sustainability*, 11(15), 4028. <https://doi.org/10.3390/su11154028>
- White, B. X., Jiang, D., & Albarracín, D. (2021). The limits of defaults: The influence of decision time on default effects. *Social Cognition*, 39(5), 543–569. <https://doi.org/10.1521/soco.2021.39.5.543>
- Willett, W., Rockström, J., Loken, B., Springmann, M., Lang, T., Vermeulen, S., Garnett, T., Tilman, D., DeClerck, F., Wood, A., Jonell, M., Clark, M., Gordon, L., Fanzo, J., Hawkes, C., Zurayk, R., Rivera, J., De Vries, W., Majele Sibanda, L., ... Murray, C. (2019). Food in the anthropocene: The eat–lancet commission on healthy diets from sustainable food systems. *The Lancet*, 393(10170), 447–492. [https://doi.org/10.1016/S0140-6736\(18\)31788-4](https://doi.org/10.1016/S0140-6736(18)31788-4)
- Zhou, X., Perez-Cueto, F. J. A., Dos Santos, Q., Bredie, W. L. P., Brugarolas Molla-Bauza, M., Mello Rodrigues, V., Buch-Andersen, T., Appleton, K. M., Hemingway, A., Giboreau, A., Saulais, L., Monteleone, E., Dinnella, C., & Hartwell, H. (2019). Promotion of novel plant-based dishes among older consumers using the 'dish of the day' as a nudging strategy in 4 EU countries. *Food Quality and Preference*, 75, 260–272. <https://doi.org/10.1016/j.foodqual.2018.12.003>