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Working Paper

Long-run effects of behavioral interventions: Experimental evidence on meat consumption

Ruhr Economic Papers, No. 1180

Provided in Cooperation with:

RWI – Leibniz-Institut für Wirtschaftsforschung, Essen

Suggested Citation: Eßer, Jana; Flörchinger, Daniela; Frondel, Manuel; Sommer, Stephan (2025) : Long-run effects of behavioral interventions: Experimental evidence on meat consumption, Ruhr Economic Papers, No. 1180, ISBN 978-3-96973-365-3, RWI - Leibniz-Institut für Wirtschaftsforschung, Essen, <https://doi.org/10.4419/96973365>

This Version is available at:

<https://hdl.handle.net/10419/333894>

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Imprint

Ruhr Economic Papers #1180

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www.rwi-essen.de

The Institute has the legal form of a registered association;
Vereinsregister, Amtsgericht Essen VR 1784

Published by

RWI – Leibniz-Institut für Wirtschaftsforschung e.V.
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The working papers published in the series constitute work in progress circulated to stimulate discussion and critical comments. Views expressed represent exclusively the authors' own opinions and do not necessarily reflect those of the editors.

RWI is funded by the Federal Government and the federal state of North Rhine-Westphalia.

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ISSN 1864-4872 (online)
ISBN 978-3-96973-365-3
DOI <https://dx.doi.org/10.4419/96973365>

Long-Run Effects of Behavioral Interventions: Experimental Evidence on Meat Consumption

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Keywords: Framed field experiment; meat consumption; climate change mitigation

JEL Codes: D12; D91; Q18

Abstract

Habits pose a potentially strong barrier to reducing meat consumption. Drawing on data from a framed field experiment over 14 months, we address the challenge of changing meat consumption habits and examine whether repeated informational and supportive newsletter interventions reduce self-reported meat consumption. While on average we find no evidence for a reduction in meat intake in response to the interventions, individuals with favorable pre-conditions, such as those with a low baseline consumption, moderately decrease their meat consumption. In addition, the interventions were effective in changing meat consumption among female but not male respondents. A back-of-the-envelope calculation indicates that the scope for reducing nutrition-related carbon emissions through newsletters is small.

Acknowledgements: We are highly grateful for valuable comments and suggestions by Morten Nyborg Støstad, Davide Domenico Pace, Alexander Roth, Colin Vance, participants of the RWI therapy research seminar, the 17th RGS Doctoral Conference in Economics, the 9th Workshop on Experimental Economics for the Environment, the 2024 Advances with Field Experiments Conference, the EEA-ESEM 2024 Conference and the 29th EAERE Conference 2024. We gratefully acknowledge financial support by the E.ON Foundation. Occasionally, the writing was enhanced with the assistance of AI applications DeepL and ChatGPT, specifically focusing on linguistic improvements rather than altering the context or factual content. The experimental design of this study and the main analyses were pre-registered at the AEA RCT Registry (trial number: AEARCTR-0009908).

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1 Introduction

Livestock breeding causes significantly more environmental harm than the cultivation of plant-based foods (Willett et al., 2019). Nevertheless, meat consumption remains high for reasons such as taste (Valli et al., 2019; Van Den Berg et al., 2022), health concerns (Graça et al., 2015; Segovia et al., 2023), a lack of cooking skills (Randers et al., 2021), and a lack of awareness about the positive environmental impacts of reducing meat consumption (Bailey et al., 2014; Lohmann et al., 2022; Macdiarmid et al., 2016). While several previous studies have targeted these barriers via information provision (e.g., Carfora et al., 2022; Cordts et al., 2014; Dannenberg & Weingärtner, 2023; Imai et al., 2022; Jalil et al., 2020, 2023; Lohmann et al., 2022; Loy et al., 2016; Perino & Schwirplies, 2022; Segovia et al., 2023; Weingarten et al., 2022; Wistar et al., 2022; Wolstenholme et al., 2020), their results are inconclusive. A meta-study by Lohmann et al. (2024) concludes that the provision of information and educational messages have only small or statistically insignificant effects on food consumption.

One reason for these outcomes may be that meat consumption is a highly habitual behavior. The literature shows that habits play an important role in nutrition (e.g., Allom & Mullan, 2012; de Bruijn et al., 2008; Schösler et al., 2014; van't Riet et al., 2011) and are among the main barriers to changing eating behavior (Gardner et al., 2011; Rees et al., 2018; Stoll-Kleemann & Schmidt, 2017). Although habits can increase decision-making efficiency by reducing the need for repeated information processing, forming new habits requires a substantial investment in knowledge and skill acquisition, intention formation, and sustained self-regulation until behavior becomes automatic (Gardner & Lally, 2018; Stigler & Becker, 1977). Therefore, while short-term interventions may only have a limited impact on behavior, repeated long-term interventions may be more successful in forming new habits.

In fact, repeated long-term interventions have proven effective in altering habits in areas such as exercising (Acland & Levy, 2015; Charness & Gneezy, 2009; Royer et al., 2015), water and energy consumption (Allcott & Kessler, 2019; Ferraro & Price, 2013), and hand-washing (Hussam et al., 2022). Yet, research on habit change in meat consumption is limited, with only a few studies evaluating interventions like education on plant-based cooking — despite the potential of such interventions to reduce meat intake (see Kwasny et al., 2022, for a literature review).

This study investigates whether a long-term intervention that provides knowledge and enhances skills can facilitate habit formation in the context of meat consumption. To this end, in a large-scale randomized framed field experiment, we surveyed the meat consumption of approximately 1,400 individuals in Germany five times over a period of 14 months and tested whether two kinds of newsletter interventions, as well as their combination, led to a reduction in meat consumption. One kind of newsletter focused on enhancing cooking skills, offering vegetarian recipes and general tips to reduce meat consumption, the other informed about the environmental benefits of cutting back on meat. After the baseline survey, we sent up to eight newsletters within a four-month period to each participant of the treatment groups.

We contribute to the literature in several respects. First, we implemented a repeated long-term intervention to explore whether such an approach can effectively change habits. With our repeated interventions, we address both intention formation and action initiation (Gardner & Lally, 2018). In addition, with the repetition of the interventions, we address the demand for sustained motivation in habit formation.

Second, by observing meat consumption over the course of 14 months, we estimate both the short- and long-term effects of the newsletter intervention, providing insights into its potential to foster sustained behavioral change. In particular, observing meat consumption beyond the end of the intervention allows us to test whether participants have changed their meat consumption and whether this behavior has become habitual. Third, we compare the effects of each newsletter type individually and also assess the impact of combining both types of newsletters.

Finally, while much of the received research focuses on meat consumption in cafeterias, canteens, and restaurants, our study considers participants' total meat consumption, including home-cooked meals. Such meals have been rarely examined, but represent a significant portion of overall consumption. In our study, for example, participants reported preparing some 80 percent of their meals themselves.

On average, we find no effect of the newsletter interventions on meat consumption. However, heterogeneity analyses show that the interventions were effective for subgroups with favorable preconditions, such as low baseline meat consumption, a high proportion of vegetarian peers, and attention to healthy eating. Most importantly, for these subgroups, the repeated newsletter was not only effective in the short run but led to even higher reductions in meat

consumption in the long run after the end of the intervention. Thus, for subgroups with favorable preconditions, the interventions effectively changed eating habits. In addition, in line with the argument that meat consumption remains high due to a lack of awareness about the positive environmental impacts of reducing meat consumption, informing respondents about these impacts tends to have been more effective for those with low prior knowledge.

We conclude our analysis with a back-of-the-envelope calculation estimating the potential reductions in nutrition-related carbon emissions attributable to the newsletters. While the intervention yields notable effects within certain subgroups, the overall impact on emissions is modest. This suggests that more conventional policy instruments — such as a carbon tax on food — are likely to be more effective in achieving substantial reductions in nutrition-related emissions.

The paper proceeds as follows: Section 2 describes the experimental design and our study sample. Section 3 provides some baseline statistics and results on treatment uptake, while Section 4 presents the estimated effects of the newsletter intervention on meat consumption. Section 5 summarizes the results and concludes.

2 Experimental Design

We conducted a framed field experiment over the period of roughly 14 months, in which we surveyed meat consumption of approximately 1,400 meat-eating individuals in one baseline and four follow-up surveys — two, four, seven, and 14 months after the baseline. After the baseline survey, we started the newsletter intervention, sending up to eight newsletters over the period of four months to each participant of the treatment groups. Subjects of the control group did not receive a newsletter. The following sections describe the design and implementation of the experiment in detail.

2.1 Setup

In each survey, we used a Food Frequency Questionnaire (FFQ) to ask participants how many portions of meat they ate in the previous four weeks. A FFQ is a common method to elicit meat consumption (e.g., Camp & Lawrence, 2019; Sparkman et al., 2021) and food intake in general, especially in nutritional and medical studies (e.g., Rohrmann et al., 2013; Stewart

et al., 2021). For our FFQ, we adapted the Oxford Meat Frequency Questionnaire developed by Stewart et al. (2021), which was designed to assess interventions aimed at reducing meat consumption. In the original questionnaire participants report their meat and seafood consumption over the past day. It distinguishes between various types of meat products, including low-meat mixed dishes (e.g., curries or stews), slices (e.g., turkey, ham), breaded or battered items (e.g., nuggets), pies and pastries, burgers, and sausages.

We modified these categories to better suit the objectives of our study and structured our FFQ into the following nine categories:

1. Cold cuts, sausage spread, ham (cubes) and the like
2. Bratwurst, boiled sausage and the like
3. Schnitzel, steak and the like
4. Poultry
5. Doner kebab, gyros, burgers and similar dishes with meat or sausage
6. Pizza, pide, quiche and similar dishes with meat or sausage
7. Mixed dishes like salads, soups or rice dishes with meat or sausage
8. Snacks with meat or sausage
9. Fish and seafood.

We included the last category to prevent participants from mistakenly reporting fish consumption in one of the meat categories. Similar to Sparkman et al. (2021), we provided examples and pictures that illustrate the size of one portion for each category (see Supplementary Materials, Section 3, Question F1 for an example). For each category, respondents could choose whether they would like to report their meat consumption in servings per day, per week, or per month.

Although the Oxford Meat Frequency Questionnaire was originally designed to measure meat and seafood consumption over the previous 24 hours, we adapted it to assess respondents' intake over the past four weeks. This approach aligns with Sparkman et al. (2021), who employed a repeated FFQ to evaluate the effects of reduction and elimination appeals, as well as norm messages, on meat consumption. One advantage of using a longer, four-week recall period is that it helps smooth out short-term anomalies — such as holidays or special events — that might otherwise distort typical consumption patterns. On the downside, this extended recall period may also increase the risk of recall bias compared to shorter time frames. However, Øverby et al. (2014) evaluated the test-retest reliability of a FFQ measuring average consump-

tion of various food and beverage items over a four-week period and reported good reliability, with a median Spearman correlation coefficient of 0.52 across all food groups for repeated administrations. Similarly, a meta-analysis by Cui et al. (2021) found comparable correlation coefficients for FFQs, noting slightly higher reliability in studies employing longer recall intervals of up to 12 months (see Thompson & Subar, 2017) for a review of the advantages and disadvantages, and validity of FFQs and instruments for dietary assessment).

In addition to meat intake, we elicited the participants' intentions, attitudes and motives with respect to a reduction in meat consumption, their perceived norms of eating meat, and whether they felt in control of their meat consumption (see Supplementary Materials, Section 3 for the questionnaire). Furthermore, we collected data on their socioeconomic and demographic and psychological characteristics.

Experimental Groups and Interventions

In the baseline survey, we randomly assigned participants to one of four experimental groups: a control group and the treatment groups called 'Information', 'Support', and 'Combined'. We informed participants of the treatment groups that in our research project, we conceived several newsletters on a climate- and environmentally-friendly diet and invited them to receive and read these newsletters. To disguise that we use the newsletters to treat the participants, we told them that we were highly interested in their opinion about the newsletters, which they could state in the follow-up surveys. Subjects of the treatment groups had the opportunity to reject the invitation or to unsubscribe from the newsletters at any time. Those who accepted the invitation received eight newsletters via email, one every two weeks over a period of approximately 4 months, starting immediately after the baseline survey period in August 2022.

Newsletters for the group 'Information' illustrated the benefits of a reduction in meat consumption for the climate and environment. Newsletters for the group 'Support' provided recipes for vegetarian dishes and tips that may help to reduce meat consumption. The group 'Combined' received a combination of both newsletters. They were appended in one document with the order being randomized such that for half of the group the 'Information' newsletter was first and for the other half the 'Support' newsletter was first. A translated example of the newsletters can be found in Appendix H.

In the treatment emails, we reminded participants of their agreement to receive newsletters and asked them to have a close look at them, because we were highly interested in their opin-

ion. We then showed a preview of the newsletter (Figure H.3), which was either a summary of the topic of the ‘Information’ newsletter or a list of three dishes featured in the full version of the ‘Support’ newsletter. Subjects of the ‘Combined’ group saw both previews, in the same order as the full ‘Combined’ newsletter. The newsletters could be accessed via a link provided below the preview. At the bottom of the email, we provided the opportunity to opt out of receiving further newsletters.

Timeline of Surveys

To analyze the effect of our interventions both in the short and in the long run, we elicited baseline meat consumption (July / August 2022) and meat consumption two months (September / October 2022), four months (November / December 2022), seven months (February 2023), and 14 months (September / October 2023) after the baseline survey (Figure 1). When filling in the survey for the two-month follow-up, the treatment groups had already received the first three newsletters. The four-months follow-up took place immediately after the intervention was completed. The seven-months and the 14-months follow-up were conducted in the post-intervention period.

Figure 1: Timeline



Design of Newsletters

In his theory of environmental behavior, Stern (2000) suggests that personal capabilities, such as knowledge and skills, determine individual behavior. In their systematic literature review, Kwasny et al. (2022, p. 11) conclude that ‘[...] consumers who consider reducing their meat intake should primarily receive information about reasons to do so [and those] who already have intentions to reduce their meat intake require information on how to do so’. Accordingly, knowledge about the environmental impact of meat consumption, as well as cooking skills

that enable the preparation of vegetarian dishes, can be important factors in reducing meat consumption. However, Bailey et al. (2014), Macdiarmid et al. (2016), and Rattenbury and Ruby (2023) show that people are not necessarily aware of the positive impacts of a reduction in meat consumption on climate and the environment or perceive meat consumption to only play a minimal role in climate change. With respect to information on how to reduce meat consumption, in a systematic literature review, Valli et al. (2019) find that a lack of cooking skills impedes people from reducing their meat consumption.

Regarding a lack of knowledge about the environmental impacts, we indeed find that respondents have only a limited knowledge about the carbon footprint of meat products (see Table A.4 for carbon knowledge). Based on the received literature, we have decided to, first, inform study participants about the positive climate and environmental impacts of reducing meat consumption, and, second, to support their reduction of meat consumption by providing vegetarian recipes.

In accordance with Carfora, Bertolotti, and Catellani (2019) and Sanchez-Sabate and Sabaté (2019), the 'Information' newsletters emphasize the climate and environmental benefits of reduced meat consumption. Based on Bertolotti et al. (2016, 2020) and following Carfora, Catellani, et al. (2019), we use prefactual 'if ... then' statements, such as 'you can reduce your diet-related CO₂ emissions by already 27 percent if you halve your meat consumption', instead of factual messages, such as 'halving meat consumption reduces carbon emissions'. In contrast to factual framing, prefactual framing directly connects the desired outcome with the necessary behavioral change, which may be more effective, especially for individuals with a lower self-efficacy. Additionally, directly addressing individuals emphasizes the impact of their behavior. To prevent information overload (Cole et al., 1997) and to increase participant attention, each newsletter contained only three facts accompanied by pictures.

In the 'Support' newsletters, we offered a variety of recipes to address different skill levels and tastes. Our selection includes both simple and more complex recipes, as well as dishes that are naturally vegetarian, and traditional meat-based dishes that have been adapted to include vegetables, tofu, or processed meat substitutes. Seasonality was also taken into account. For instance, newsletters sent during summer contained more salads and barbecue recipes, while those sent during autumn had more recipes for soups, stews, and other seasonal dishes.

2.2 Implementation and Sample

Data for our survey experiment were collected online by the professional survey institute forsa using a state-of-the-art online survey tool. Participants were able to interrupt and resume the survey at any time. The baseline survey for our experiment was part of a larger panel survey for which forsa recruited a sample of 6,000 adults from its online panel and collected data on socioeconomic and demographic characteristics, as well as on attitudes and preferences regarding various aspects of sustainability. Half of the sample (2,999 participants) was randomly assigned to the experiment in the baseline survey, while the other half of the sample was assigned to another experiment, which is presented in Flörchinger et al. (2024).

We excluded 148 respondents who reported following a vegetarian, pescetarian, or vegan diet, resulting in a sample of 2,851 participants eligible for the experiment. Of these, 1,459 participated in all five survey waves, i.e., the baseline, the three follow-up surveys and the endline survey, and comprise our estimation sample. The sample splits roughly equally across the four experimental groups. Respondents who dropped out of the panel only differ marginally from our estimation sample (Table A.2). Note that we follow Maniaci and Rogge (2014)'s recommendation to screen for inattention and, in each survey wave, exclude those participants with a response time below one half of the median, which results in the exclusion of 67 observations on the individual-wave level from our estimation sample — see Table A.1 for more details on sample sizes and number of observations.

3 Baseline Statistics and Treatment Uptake

The key outcome variable of our study is self-reported meat consumption: For nine categories, participants reported how many portions of meat they consumed the previous month. The meat consumption variable is constructed by taking the average weight of one portion in each category and summing up the total weight of meat consumed, excluding fish and seafood. For the average weight of one portion, we draw on online sources such as recipes, supermarket offers, or entries in blogs that deal with nutrition. To check the robustness of our results, we use an alternative approach to assign the weights in which we draw on ChatGPT. The weights proposed by ChatGPT differ slightly from the results of our online search, but the results of our analyses remain qualitatively unchanged. See Supplementary Materials, Section

1 for more detailed information on the assigned weights and the online research as well as for regression results using the alternative weights (see Tables 1 & 2 in the Supplementary Materials). When respondents stated to not know or not want to report their meat consumption, we excluded their reported meat consumption for all categories, and consequently, their total meat consumption in the respective survey.

3.1 Baseline Meat Consumption

To clean the outcome variable of outliers that can potentially bias our results, we excluded all observations (on the individual-wave level) for which the reported meat consumption exceeds the 99 percent quantile in one or more categories. In a second step, we excluded all observations with an overall meat consumption above the 99 percent quantile (see Figure A.1 for distributions of overall meat consumption before and after cleaning). Our final estimation sample consists of 6,436 observations with observations for each wave varying between 1,240 and 1,296 (Table A.1).

The baseline meat consumption over the past month amounted to 4.3 kilograms (kg), on average, ranging from a minimum of 0 to a maximum of 13.7 kg (Table A.3). There is no statistically significant difference between the four experimental groups (Table A.4), and the average meat consumption is very similar to the German average of 4.2 kg per month in 2022 (Bundesanstalt für Landwirtschaft und Ernährung, 2024). Respondents consumed the highest amount of meat in the categories ‘Poultry’, ‘Schnitzel, steak and the like’, and ‘Mixed dishes’, with monthly averages of 1.0, 0.8, and 0.8 kg, respectively (Table A.3).

Male respondents consumed about 0.5 kg more meat per month than female respondents. While higher age is related to higher meat consumption, a higher level of education is related to lower meat consumption. In addition, a more positive attitude toward the reduction of meat consumption and a higher share of vegetarian peers are negatively related to meat intake, whereas respondents who identify more strongly as meat eaters and those who perceive their peers to expect them to reduce their meat consumption reported a higher meat intake. Table A.6 provides detailed regression results for the relationship between baseline meat consumption and socio-economic characteristics and attitudes.

3.2 Newsletters

At the end of the baseline survey, participants were assigned to either the control group or one of the three treatment groups. Of the 1,078 participants assigned to the treatment groups, 917 accepted to receive the newsletters (Table 1), 145 of whom unsubscribed at a later stage of the study. Differences in baseline characteristics between respondents who rejected and accepted to receive the newsletters are negligible and mostly not statistically significant (Table B.1).

Table 1: Descriptive Results on Treatment Uptake

	Information		Support		Combined		Total	
	#	%	#	%	#	%	#	%
Assigned to receive NL	358	100.0	363	100.0	357	100.0	1,078	100.0
Accepted to receive NL	301	84.1	320	88.2	296	82.9	917	85.0
Unsubscribed from NL	40	13.3	56	17.5	49	16.6	145	15.8
Reported to have read NL in FU1	231	76.7	232	72.5	217	73.3	680	74.2
Reported to have read NL in FU2	263	87.4	264	82.5	245	82.8	773	84.3
Opened NL until FU1	126	41.9	93	29.1	74	25.0	293	32.0
Opened NL until FU2	153	50.8	112	35.0	87	29.4	352	38.4

In the first follow-up survey (FU1), approximately 75 percent of those who had accepted to receive the newsletters reported having read at least one of them. This number is similar in all groups and increased to roughly 85 percent in the second follow-up survey (FU2). Examining the data on whether participants actually accessed the newsletter via the email link, it is evident that, by the first follow-up survey, only 42, 29, and 25 percent of those who agreed to receive the newsletters had clicked on the link of at least one issue of the ‘Information’, ‘Support’, and ‘Combined’ newsletter, respectively (Table 1). These figures rose modestly to 51, 35, and 29 percent by the second follow-up survey (FU2).

The disparity between self-reported and observed shares may be due to inaccurate responses or participants mistakenly believing that reading the email corresponds to reading the newsletter. Although only reading the email without opening the newsletter was not designed as a form of treatment, participants were nonetheless exposed to the treatment, albeit at a lower intensity — through the newsletter preview embedded in the email. Other reasons for the higher self-reported shares may be social desirability bias or experimenter demand effects. However, comparing socioeconomic and psychological characteristics, environmental and political attitudes, and meat-consumption variables of participants who reported to have opened the newsletters and those who did not yields no noteworthy differences (Table B.1). In addition, experimenter demand effects are usually small (de Quidt et al., 2018) and unlikely in

online surveys due to limited or no contact between respondents and the experimenter (Mummolo & Peterson, 2019).

3.3 Intentions, Attitudes, Norms, and Motives

Based on the Theory of Planned Behavior (Ajzen, 1991), we elicited the respondents' *attitudes* and *intentions* regarding reducing their meat consumption, their perceived *injunctive norm*, and their *perceived behavioral control*. Following Wolstenholme et al. (2021), we additionally assessed the respondents' *meat-eater identity*. Furthermore, we elicited further aspects regarding the respondents' meat consumption, attitudes, and perceptions. Results are summarized in Table A.5.

On average, respondents reported medium values on their intention to reduce meat consumption, meat-eater identity, and perceived injunctive norms — whether their peers would approve of them reducing meat consumption — as well as descriptive norms — how many of their peers are vegetarians. Moreover, they expressed a rather positive attitude toward reducing meat consumption and perceived themselves as being in control over changing their consumption. Regarding their stage of change, which describes an individual's position in the behavior change process, most respondents have either not considered reducing their meat consumption yet (pre-contemplation stage: 26 percent), or they are already trying to do so (action stage: 66 percent).

This is in line with 66 percent reporting to have reduced their meat consumption in the past and estimate it to be below average. While 72 percent and 64 percent are satisfied with their current diet and consider it to be healthy, respectively, a lower share of 49 percent consider it environmentally friendly. Furthermore, respondents prepare a large share of 80 percent of their meals themselves. The most popular reasons for reducing meat consumption are health, animal welfare, and environmental and climate protection, with proportions of 91, 86 and 83 percent, respectively.

The most important barriers to reducing meat consumption are that people do not want to give up the taste of meat (61 percent), followed by eating meat being part of their tradition (44 percent), and eating meat out of habit (29 percent). More detailed information on the construction of indices, the exact wording of the questions, and the responses can be found in Table A.5 and in the questionnaire provided in the Supplementary Materials, Section 3.

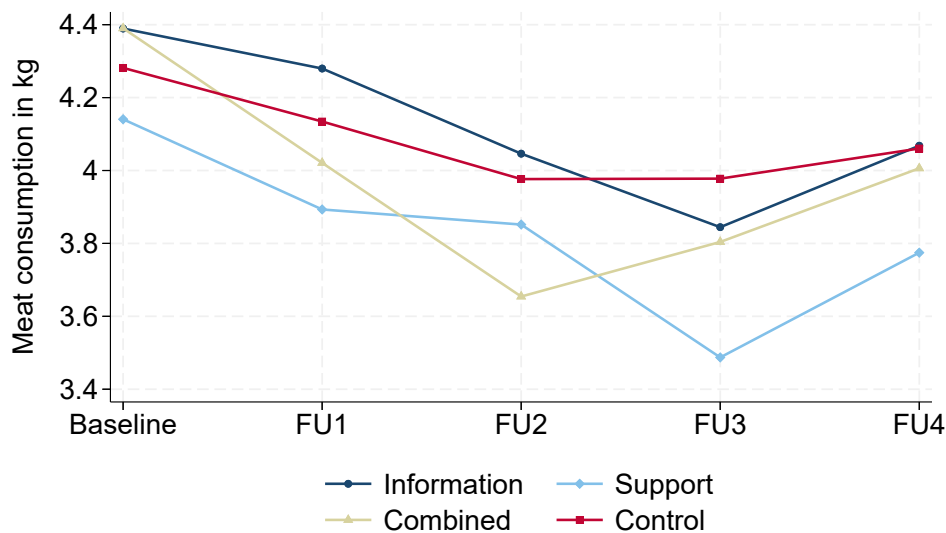
4 Effect of Newsletter Intervention on Meat Consumption

This section presents the effects of the newsletter intervention on meat consumption, as well as heterogeneity analyses with respect to meat-consumption related attitudes, norms and behavior, general attitudes, socio-demographic characteristics, and psychological factors. To check for sample composition effects and increase power, we also analyze the results for all those respondents who participated in the baseline and at least one follow-up survey, instead of only considering those who participated in all five survey waves. We find no noteworthy differences in the estimation results (Tables G.2, G.3, G.4).

4.1 Main Effects

Meat consumption, self-reported for the previous month, decreased almost uniformly from the baseline through the first and second to the third follow-up period in all experimental groups, and slightly increased again in the last period, but without reaching the baseline level again (Figure 2, Table C.1). While in the control group meat consumption decreased by approximately 6.5 percent (0.28 kg) between the baseline and the third follow-up survey (FU3), respondents in the treatment groups reduced their meat consumption by up to 14.5 percent (0.62 kg) in the group receiving the ‘Combined’ newsletter.

Figure 2: Monthly Meat Consumption over Time



We estimate the group-specific dynamic treatment effects in terms of changes in absolute meat consumption in kilograms using the following difference-in-differences approach with individual and time fixed effects:

$$y_{it} = \alpha_i + \beta_{1t}INFO_i * \tau_t + \beta_{2t}SUPPORT_i * \tau_t + \beta_{3t}COMBINED_i * \tau_t + \lambda_t + \epsilon_{it}, \quad (1)$$

where y_{it} represents meat consumption in the past month of individual i in period t . α_i represents individual-specific fixed effects, τ_t is an indicator for the five experimental periods, and λ_t represents the time fixed effects for these periods. $INFO_i$, $SUPPORT_i$, and $COMBINED_i$ are indicators for treatment assignment. With this approach, we estimate the intention-to-treat effect (ITT), as we compare participants in the control group to those assigned to one of the treatment groups, irrespective of whether they actually received or read the newsletters.

Estimation results confirm the descriptive finding of a negative trend in meat consumption in the control group: self-reported consumption decreased from baseline to each follow-up period, with larger and statistically significant reductions in the second and third follow-up periods (Figure C.1). While this decrease could theoretically be attributed to a general negative time trend, national data show that average meat consumption in Germany fell by less than one percent between 2022 and 2023 — during the study period (Bundesanstalt für Landwirtschaft und Ernährung, 2024). Furthermore, meat consumption reported by respondents in the endline survey who had not participated in any prior FFQs is significantly higher than that reported by respondents in the control group (Table G.1). This suggests that repeated inquiries about meat intake may increase participants' awareness of their consumption, contributing to the observed decline over time, even in the control group. The difference-in-differences approach accounts for these changes in the control group and isolates the additional reductions in meat consumption attributable to the newsletter interventions.

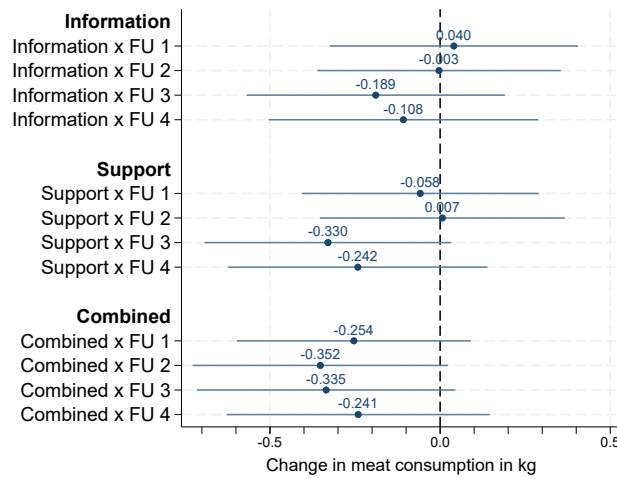
Estimation results provide suggestive evidence that the newsletter interventions led to an additional reduction in meat consumption compared to the control group, especially in the 'Combined' group and the third follow-up period in the 'Support' group (Figure 3a). The effects tend to have increased over time — they were highest three months after the end of the intervention and persisted even eight months later. The highest effect is a reduction by 0.35 kg in the 'Combined' group in the second follow-up period, which amounts to a relative

reduction of 8 percent. The effects are, however, not statistically significant at conventional levels, with 95 percent confidence intervals ranging from -0.73 to +0.41 kilograms (Table C.1).

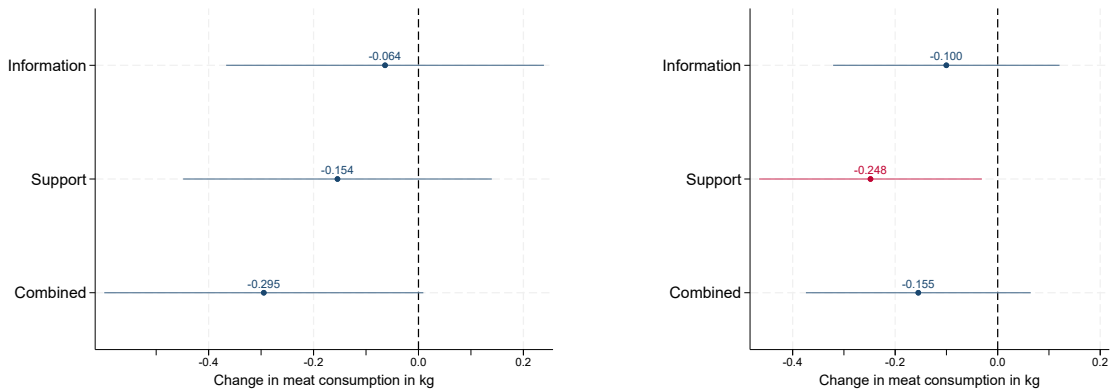
A comparison with the minimum detectable effect, estimated through an ex-ante power analysis, suggests that the lack of significant estimates may be due to insufficient power. For a sample size of 1,400 individuals, a standard deviation in meat consumption of 70 percent, and 80 percent power, the estimated minimum detectable effect is 13 percent, which is 5 percentage points higher than the highest estimated reduction of 8 percent (see Section 2 in the Supplementary Materials for the ex-ante power analysis). To increase power, we pool all follow-up periods (Figure 3b) and all treatment groups (Table C.3). In line with the previous findings, results suggest a negative treatment effect but are again not statistically significant.

As an alternative to the difference-in-differences approach, we use a pooled OLS regression in which we control for baseline meat consumption and attitudinal variables to increase power (McKenzie, 2012), being in line with our ex-ante power analysis (see Supplementary Materials, Section 2 for more details on the power analysis). The effect sizes are largely in accordance with the results based on the difference-in-differences approach, with the effect of the ‘Support’ newsletter being statistically significant at the 5 percent level (Figure 3c).

Figure 3: Effect of Treatment Assignment on Meat Consumption in kilograms



(a) Difference-in-differences (DiD) approach with Dynamic Treatment Effects



(b) Difference-in-differences (DiD) Approach with Pooled Follow-up Periods **(c) Pooled OLS Estimation with Lagged Dependent Variable**

Note: Difference-in-differences estimations include individual- and time-fixed effects. In the pooled OLS estimation, we control for baseline meat consumption and several attitudinal variables and sociodemographic characteristics. See Tables C.1, C.2 and C.4 for the detailed estimation results.

Since the weight of a portion differs across categories, especially for the categories for breakfast and snacks (1 and 8) and those for main dishes (2 - 7), we separately summarize meat consumption in the categories for breakfast and snacks and those for main dishes, as consumers may not have in mind cold cuts, bacon, and the like, when they think about their meat consumption. While there is almost no decrease in meat consumption in breakfast and snacks, reductions are much higher in the main dishes (Table D.1). Investigating meat consumption in all categories separately reveals that these reductions are mainly driven by category 3: 'Schnitzel, steak and the like', in which subjects of the treatment groups have reduced their consumption relative to the control group quite substantially and statistically sig-

nificantly from the baseline to the first and second follow-up survey (Table D.1). This result suggests that, at least in the short term, our newsletters were successful in decreasing meat consumption in that category that is typically associated with meat.

4.2 Average Treatment Effect on the Treated

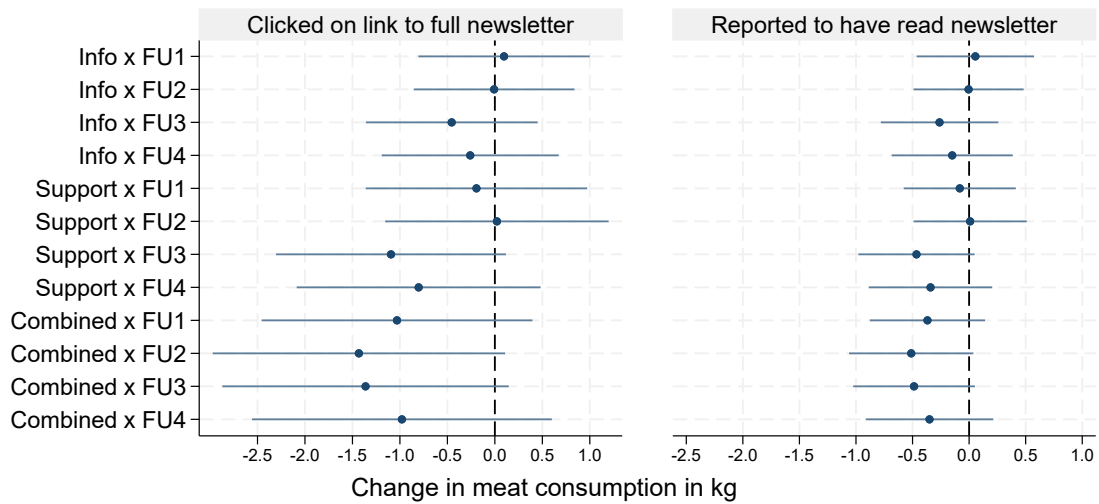
To estimate the Average Treatment effect on the Treated (ATT), that is, on those who actually opened the newsletters, we instrument treatment uptake with treatment assignment (Angrist & Pischke, 2009). Using randomized treatment assignment as an instrument for treatment uptake ensures that the relevance condition is satisfied because assignment strongly predicts uptake (see Table E.1 for first-stage regression results). In addition, the exclusion restriction is satisfied, as treatment assignment can affect meat consumption only through its effect on newsletter uptake: Participants who do not open the newsletter are not exposed to its content and thus not treated.

In the first stage of the instrumental variable approach, for each of the three treatment groups, we estimate the effect of treatment assignment on opening at least one of the newsletters during the intervention period based on (i) whether they actually clicked on the link to the newsletter and on (ii) self-reported reading data. In the second stage, we then use the predicted values of treatment uptake to estimate the effect of opening the newsletters on meat consumption.¹

While point estimates indicate substantial average reductions in meat consumption of up to one kilogram per month, especially in the two treatment groups that received the ‘Support’ newsletter, none of the effects is statistically significantly different from zero (Figure 4, Table E.2). This does not change when using self-reported reading instead of actually opening the newsletters.

¹Because treatment assignment is only observed once (and is time-invariant), the first-stage regressions are estimated using the cross-sectional. Predicted treatment uptake is then merged back into the panel dataset and used as an instrumented regressor in a differences-in-differences model with individual and time fixed effects, where it is interacted with the time variable to estimate dynamic treatment effects, as defined in equation 1. Since the treatment variables are estimated in the first stage and thus constitute generated regressors, the second stage will give incorrect standard errors. We thus compute standard errors in the second-stage regression using a nonparametric bootstrap. (Cameron & Trivedi, 2005). Our bootstrap procedure resamples individuals and re-estimates both the first and second stages within each replication.

Figure 4: Average Treatment Effect on the Treated: Treatment Effect for Respondents who Opened the Newsletters



4.3 Subgroup Analyses

Wide confidence intervals of treatment effects may reflect effect heterogeneity, with significant changes in meat consumption in some subgroups being neutralized by insignificant changes or opposing effects in others. Therefore, we separately estimate treatment effects for multiple subgroups, for which we assume that they react differently to the treatment.

We begin with the pre-specified heterogeneity analyses and estimate treatment effects for individuals with different descriptive and injunctive norms, and being in different stages of change at the time of the baseline survey. Based on the results of these analyses, we additionally explore heterogeneity with respect to baseline meat consumption and further attitudinal and socio-demographic variables.

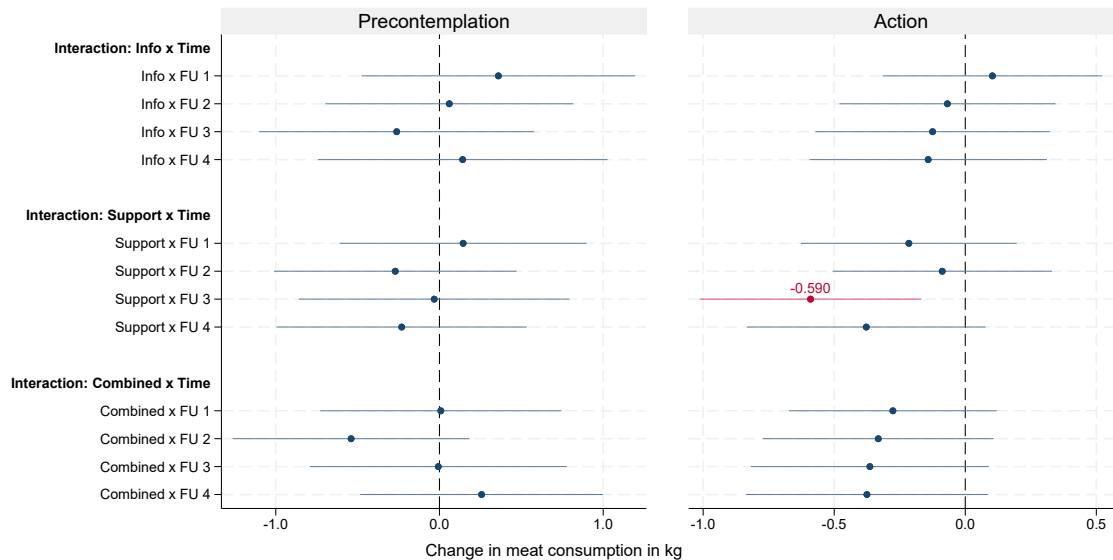
4.3.1 Pre-specified Heterogeneity Analyses: Stage of Change and Norms

Regarding the baseline stage of change, there seems to be no treatment effect for respondents who have not yet considered reducing their meat consumption (pre-contemplation stage), whereas all treatments tend to have decreased meat consumption among participants who had already reduced their meat consumption by the time of the baseline survey (action stage) (Figure 5).² Overall, interacting treatment assignment with an indicator for the four stages of change suggests that greater advancement in the change process is generally associated with a

²Given that only 65 participants can be categorized into the contemplation stage and 40 into the preparation stage, we refrain from interpreting the results for these groups.

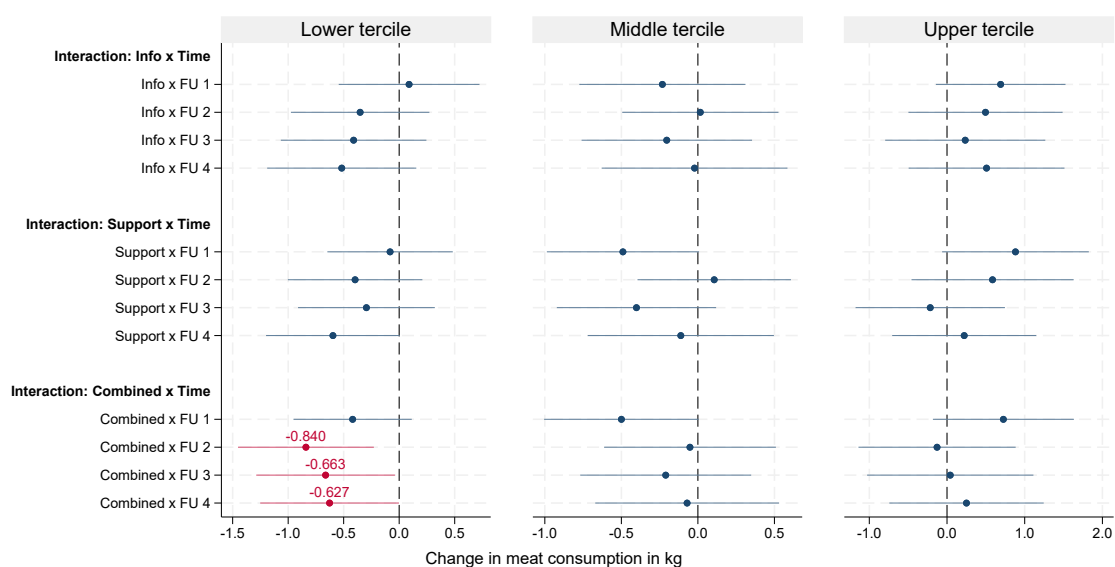
larger decrease in meat consumption in response to the 'Support' and 'Combined' treatments. However, this effect is not statistically significant at the 5 percent level (see Figure 8).

Figure 5: Subgroup Analysis: Stages of Change



Regarding the perceived norms, our results suggest that a higher share of vegetarian peers (descriptive norm) is related to a stronger decrease in meat consumption in the 'Support' and the 'Combined' group (Figure 8). Perceiving peers to approve of reducing one's meat consumption (injunctive norm) seems to have the opposite effect: For the lower tercile — that is, respondents who perceive to a low extent that their peers would approve of them changing their behavior — the information and support treatment tend to have decreased the respondents' meat consumption, and there are even large and significant negative effects for the combined treatment (Figure 6). Individuals in the upper tercile, in contrast, tend to have increased their meat consumption in response to the newsletters (see also Figure 8 for the interaction effect of treatment assignment and injunctive norm). One explanation for this rather non-intuitive but insignificant result may be that those individuals perceiving a low injunctive norm are those who already consume little meat, while those with a high injunctive norm perception have a high meat consumption and are thus made aware of this by their peers. Comparing the baseline meat consumption between the three groups confirms this assumption: meat consumption in the group with the strongest injunctive norm perception is significantly higher by 1.1 kilograms than in the lowest norm group (Table F.4).

Figure 6: Subgroup analysis for Perceived Injunctive Norm

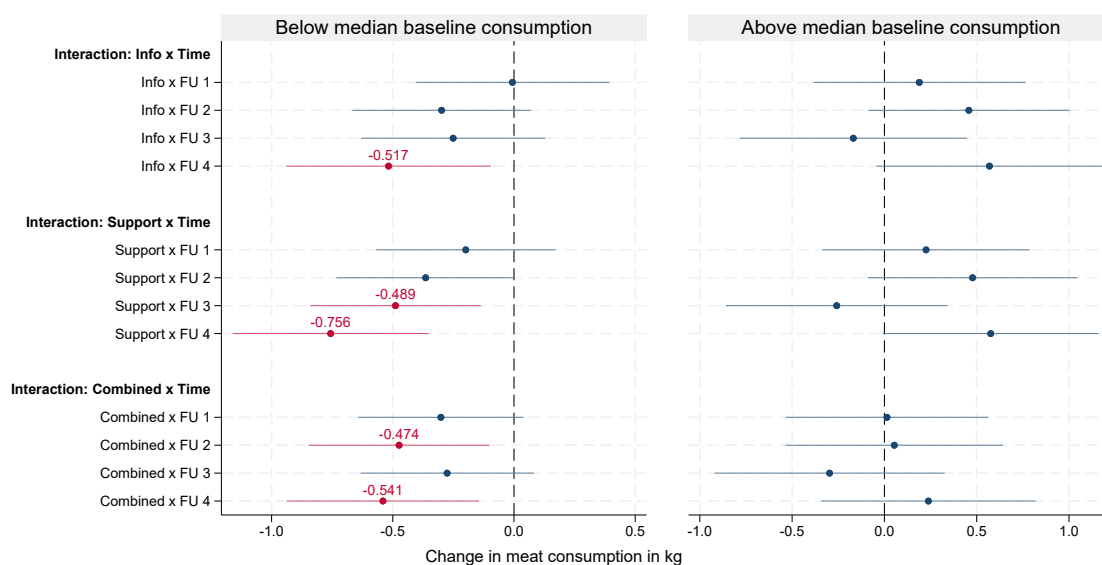


4.3.2 Exploratory Heterogeneity Analyses

As suggested by the injunctive norm analysis, another potential source of treatment effect heterogeneity may be baseline meat consumption. This source of treatment effect heterogeneity has also been shown by other studies, e.g., on public transport (Gravert & Collentine, 2021) and energy consumption (Ferraro & Price, 2013). Here, two contrasting mechanisms are possible: First, individuals with high baseline meat consumption have a higher potential for reducing their consumption than those who already consume little meat, which may lead to higher treatment effects (in absolute terms) among those with high baseline meat consumption. Second, reducing meat consumption may be easier for individuals who already consume little, e.g., because they are more familiar with preparing vegetarian dishes. This may lead to higher treatment effects in the group with low baseline meat consumption, which would be in line with the heterogeneity regarding injunctive norm perceptions. To pursue these possibilities, we divide the sample into groups with below and above median baseline meat consumption.

Results show evidence for the second mechanism: While the point estimates suggest a positive but insignificant increase in meat consumption for the above median group, participants in the below median group substantially and significantly reduced their meat consumption. Figure 7 shows that all newsletter interventions significantly decreased meat consumption in this group, with effects increasing over time. While the ‘Information’ newsletter seems to have had no effect in the first follow-up period, respondents tend to have reduced their meat con-

Figure 7: Treatment Effect for Respondents with Below and Above Median Baseline Meat Consumption



Note: The figure shows point estimates and 95% confidence intervals.

sumption in the second and third follow-up periods by 0.30 and 0.25 kilograms, respectively, compared to the baseline. Moreover, there is a highly significant reduction of 0.52 kilograms in the last follow-up period. Similarly, we find increasing treatment effects for the provision of vegetarian recipes, with significant reductions of 0.49 and even 0.76 kilograms in the last two follow-up periods. The combination of both newsletter interventions significantly reduced meat consumption by 0.47 and 0.54 kilograms in the second and fourth follow-up periods. Considering the average baseline meat consumption of roughly 2 kg in the low consumption group, these reductions are quite substantial, corresponding to a relative reduction of up to roughly 25 percent. For individuals who already consumed little meat in the baseline survey, treatment effects thus not only increase over time during the intervention period, but they are even highest in the last survey period almost one year after receiving the last newsletter.

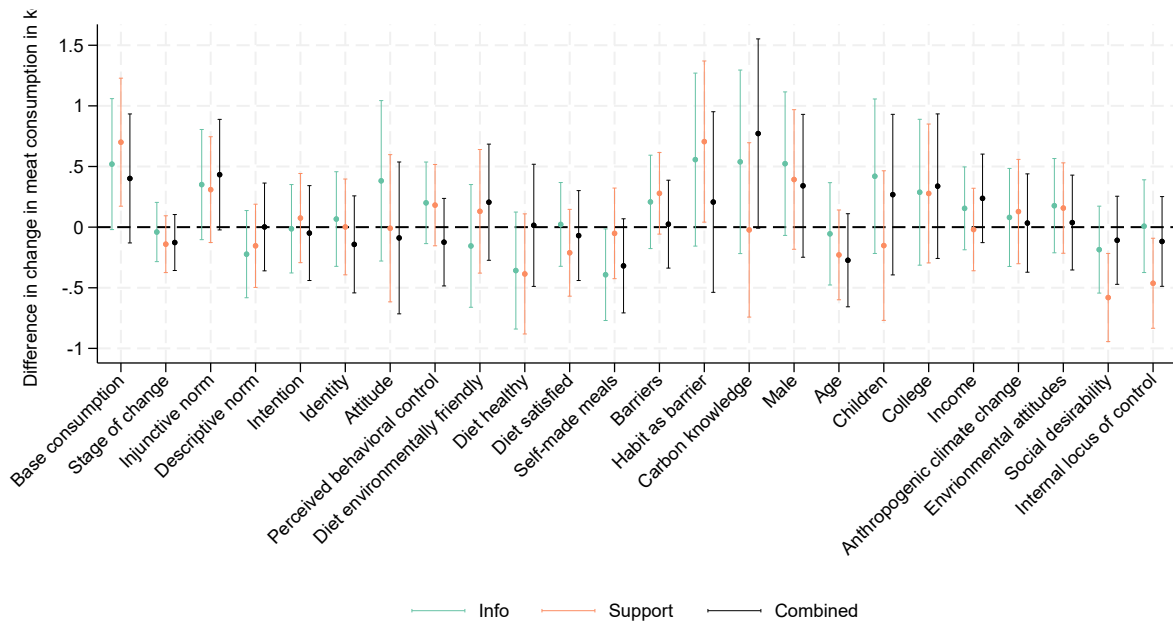
To further explore the suggestive evidence of an increase in meat consumption for individuals with above median baseline meat consumption, we pool all follow-up periods to increase power. While the negative effects for the low consumption group can be confirmed, we continue to find no significant effects for the high consumption group (Table F.1).

One reason for the treatment effect heterogeneity with respect to baseline meat consumption may be that respondents with a low baseline consumption are already accustomed to eating little meat. However, this heterogeneity may also result from different attitudes toward

meat consumption. Characterizing the two subgroups reveals distinct differences between respondents with low versus high baseline meat consumption (Table B.2): Individuals with lower baseline meat consumption were more likely to be female, more advanced in the behavioral change process, tend to have been more engaged with the intervention, and overall exhibited demographic, attitudinal, and psychological profiles consistent with greater readiness and capacity to reduce meat consumption. These characteristics may have facilitated a reduction in meat consumption and contributed to behavioral change in response to the newsletter intervention.

Exploratory heterogeneity analyses reveal that there is no clear heterogeneity with respect to most attitudinal variables besides norms and stage of change (Figure 8). However, perceiving one's diet as healthy, satisfaction with one's diet, self-preparing meals and reporting fewer barriers to reducing meat consumption tend to be related to larger negative treatment effects, i.e., a larger reduction in meat consumption. A closer look at choosing meat out of habit as a barrier to reducing meat consumption reveals clear and partially significant reductions for respondents who did not report this barrier, whereas those who did report it tend to have increased their meat consumption in response to the treatment (Figure F.1).

Figure 8: Treatment Effect Heterogeneity with respect to Attitudinal Variables



Note: Point estimates and 95% confidence intervals for the interaction of the respective variable with treatment assignment; variables are coded as follows: stage of change - 1=precontemplation, 2=contemplation, 3=preparation, 4=action; age - 1=18-29, 2=30-44, 3=45-64, 4=65 and older; income - 1=below 1,200, 2=1,200-2,700, 3=2,700-4,200, 4,200 and higher; climate change - 1=does not exist, 2=natural, 3=natural & anthropogenic, 4=anthropogenic; binary variables for male, children, college and habit as barrier; all other variables - 1=lower tercile, 2=middle tercile, 3=upper tercile; for attitude, share of self-made meals, satisfaction with diet and carbon knowledge, data can only be split into two categories.

While general climate change and environmental attitudes seem to not have influenced treatment effectiveness, there tends to be heterogeneity with respect to general psychological characteristics (Figure 8): Respondents who are more inclined to provide socially desirable responses significantly reduced their meat consumption in response to the support treatment in all follow-up periods, whereas effects for those with a low tendency for socially desirable responses even tend to have increased their meat intake (Figure F.2).³ Similarly, a higher internal locus of control is related to a stronger reduction of meat consumption in the ‘Support’ group (Figure F.3).

Treatment effect heterogeneity with respect to social desirability may be concerning as it suggests that reductions in reported meat consumption may be driven by response bias. However, there are several arguments speaking against this concern. First, due to the time span between self-reports of at least one and up to eight months, it is unrealistic that respondents remembered their entries in the FFQ from the previous waves. Second, there seems to be no

³To measure social desirability bias, we used the German version of the Social Desirability-Gamma Short Scale by Nießen et al. (2019). See question PK5 in the questionnaire in the Supplementary Materials, Section 3 for the wording of the items.

relation between baseline meat consumption and the measure for social desirability bias (Table A.6). Third, adding social desirability as a control variable in the pooled OLS regression does not change the estimated treatment effects (Table C.4, Model III). Fourth, an exploratory analysis in which we test treatment effect heterogeneity with respect to social desirability separately for respondents with low and high baseline meat consumption — the dimension for which we find the strongest treatment effect heterogeneity — reveals that the significant reductions in the low consumption group seem not to be related to social desirability bias (Table F.2). In contrast, for the high consumption group we find increases in meat consumption for individuals scoring high on the social desirability scale, while effects are negative for those with low scores (Table F.3). That is, while estimated treatment effects may be partly driven by social desirability bias, this does not seem to be the case for individuals with overall favorable preconditions for reducing their meat consumption.

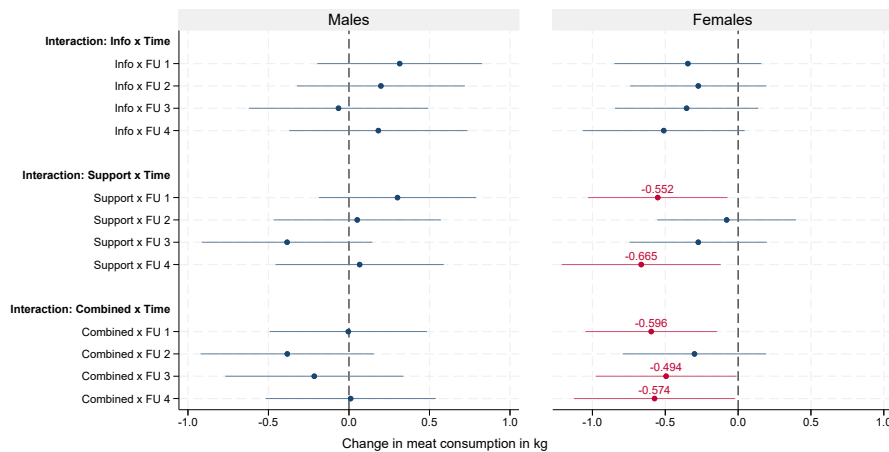
Finally, while social desirability scales aim to measure whether individuals give socially desirable responses in terms of presenting themselves in an overly positive way, i.e., a response bias (style hypothesis), the same scales may also measure socially desirable personality traits, that is, characteristics that make individuals truly behave in a socially desirable way (substance hypothesis). In a meta analysis, in which the authors compare scores on different social desirability scales with prosocial behavior in games, Lanz et al. (2022) find that it is unclear whether social desirability scales measure style or substance. Thus, while the higher reduction in meat consumption in response to the ‘Support’ newsletter for individuals with a high social desirability score may indicate that (at least part of) the treatment effect is driven by response bias instead of true behavior change, it may also suggest that it is mainly driven by individuals with personality traits that are related to socially desirable behavior.

Overall, rather than a single observed attitudinal variable, it seems to be a combination of various characteristics such as being already accustomed to cutting down on meat instead of usually choosing meat out of habit, having vegetarian peers or a healthy diet that drives the effect heterogeneity with respect to baseline meat consumption.

In addition, there is evidence for treatment effect heterogeneity with respect to gender. A subgroup analysis reveals that, while there are no significant effects for men, with some point estimates even suggesting an increase in meat consumption, women significantly reduced their meat consumption (Figure 9). As with the low baseline-consumption group, reductions increased over time and were highest in the last survey about eleven months after receiving

the last newsletter. This gender heterogeneity may be linked to differences in baseline meat consumption, as women reported significantly lower baseline consumption than men (Table A.6). However, separate analyses of baseline consumption heterogeneity by gender reveal that both women and men significantly reduced their meat consumption when their baseline consumption was below the sample median (Table F.5). In contrast, for those with above-median baseline consumption, no significant reductions are observed. For women, the effects remain mainly negative, while for men, point estimates suggest an increase in consumption. In other words, while women reduced their meat consumption regardless of baseline levels, men only reduced consumption when their baseline intake was low, and tended to increase consumption when it was high.

Figure 9: Treatment effect by gender



Considering findings from the literature, this gender heterogeneity is not surprising. Several experimental studies confirm treatment effect heterogeneity with respect to gender (Cordts et al., 2014; Dannenberg & Weingärtner, 2023; Dannenberg et al., 2024; Jalil et al., 2020, 2023; Perino & Schwirplies, 2022). In addition, there are multiple studies showing not only that men consume more meat than women (Cordts et al., 2014; Hopwood et al., 2024; Peeters et al., 2023) and that meat consumption is associated with masculinity (De Backer et al., 2020; Stanley et al., 2023), but also that men and women differ in their meat-eating justifications and values. First, women seem to feel more uncomfortable with eating meat and use more apologetic justifications for their meat consumption than men (Rothgerber, 2013). Second, Hayley et al. (2015) find that the values of Universalism and Power are predictive of meat consumption and attitudes. While Universalism — defined by Schwartz et al. (2012) as ‘understanding, appreciation, toler-

ance and protection for the welfare of all people and for nature' (p.664)—is more important for women, Power — defined as 'social status and prestige, control or dominance over people and resources' — is more important for men. Third, while women attach higher importance to the advantages of reducing meat consumption, for men the potential barriers are more relevant (Cordts et al., 2014). Finally, some evidence points to genetic reasons for differences in meat consumption between men and women (Çınar et al., 2022).

Finally, the newsletter interventions tend to have been more effective for respondents who were less able to correctly rank the carbon emissions of meat products (beef, pork, and chicken) compared to vegetarian groceries (8). This finding is in line with the argument that meat consumption remains high due to a lack of awareness about the positive environmental impacts of reducing meat consumption (Bailey et al., 2014; Lohmann et al., 2022; Macdiarmid et al., 2016).

5 Summary and Conclusions

This study used a framed field experiment among a large population sample to investigate potential changes in meat consumption habits due to informational and supportive newsletter interventions over a four-month period. Observing self-reported meat consumption in five surveys — a baseline and four follow-up surveys — over a period of 14 months, we found no evidence that the newsletter interventions reduced meat consumption on average, but there are significant treatment effects for subgroups with favorable preconditions — such as a low baseline consumption — and female respondents.

For these subgroups, treatment effects increased over time and were highest in the last survey, which took place about eleven months after receiving the last newsletter. In contrast, for respondents with a high baseline meat consumption and males, meat consumption even tends to have increased in response to the newsletter interventions in some groups and follow-up periods. Our results thus suggest that it is difficult to change meat consumption for individuals who seem not to be interested in doing so, while providing information on the environmental benefits of reducing meat consumption and supporting consumers in changing their behavior can encourage subgroups with favorable preconditions to substantially and sustainably change their meat consumption ever after the intervention had ended.

Given the meat reduction estimate of 0.17 kg per month per person that is based on the pooled treatment effect across all periods for all meat categories, in a ‘back-of-the-envelope’ calculation, we are able to gauge the reduction in meat consumption and in related carbon emissions that can be achieved by a newsletter intervention as tested in this study. Assuming carbon emissions of 12.3, 4.2 and 3.7 kg per kilogram of beef, pork, and chicken, respectively (goClimate, 2025), and drawing on the pooled treatment effects for all meat categories, periods and treatment groups, we calculate a reduction in carbon emissions of roughly 10 kg per person and year. This amounts to roughly 0.1 percent of total yearly per-capita carbon emissions (see Supplementary Materials Section 4 for more details).

In short, our estimation results suggest that newsletter-based interventions might not be optimal to induce reductions in nutrition-related carbon emissions. If governments aim at reducing these emissions, other instruments might prove more successful. One obvious potential instrument could be a tax that addresses the various negative externalities of meat consumption (Funke et al., 2022). In a meta-analysis, Gallet (2010) assess that the own-price elasticity of meat consumption amounts to roughly -1. Thus, given the sample mean meat consumption of 4.3 kg per month, a tax of for instance 20 percent (the lower bound assessed by Funke et al. (2022)) would reduce meat consumption by 0.86 kg, which is about five times the effect detected in our study.

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Appendices

A Sample description

Table A.1: Overview of participation

	Total	Info	Support	Combined	Control
Full sample					
Baseline survey	2851	715	710	713	713
Follow-up 1	2313	574	582	583	574
Follow-up 2	2134	525	541	546	522
Follow-up 3	2011	508	508	505	490
Endline survey	2056	520	511	513	512
Baseline only	172	49	39	40	44
Base & ≥ 1 follow-up					
Baseline survey	2670	663	671	669	667
Follow-up 1	2305	571	582	580	572
Follow-up 2	2128	523	541	543	521
Follow-up 3	2003	505	508	501	489
Endline survey	2051	518	511	511	511
All waves	1459	370	375	366	348
... excl. speeders					
Baseline survey	1418	358	363	357	340
Follow-up 1	1459	370	375	366	348
Follow-up 2	1458	370	375	366	347
Follow-up 3	1434	363	372	355	344
Endline survey	1459	370	375	366	348
... & excl. meat outliers					
Baseline survey	1263	321	328	317	297
Follow-up 1	1322	338	331	335	318
Follow-up 2	1315	334	343	322	316
Follow-up 3	1296	327	337	318	314
Endline survey	1240	308	313	322	297
Full final sample	6436	1628	1652	1614	1542

Table A.2: Comparison of participants who dropped out of the full sample and those who participated in all five surveys

	Dropped out of sample	Participated in all surveys	Comparison (p)
Panel A: Socioeconomic and demographic characteristics			
Gender			
male	0.567	0.581	0.470
female	0.432	0.417	0.448
non-binary	0.001	0.001	0.600
Age	58.387	60.358	0.000
At least technical college	0.420	0.410	0.609
Employed	0.515	0.474	0.031
Has children	0.616	0.628	0.545
Net hh income			
<1,200 Euro	0.057	0.063	0.549
1,200 - 2,700 Euro	0.272	0.323	0.006
2,700 - 4,200 Euro	0.341	0.313	0.131
> 4,200 Euro	0.329	0.301	0.131
Panel B: Environmental attitudes			
Climate change attitudes			
Does not exist	0.073	0.044	0.001
Natural	0.059	0.043	0.050
Natural and anthropogenic	0.205	0.225	0.200
Anthropogenic	0.664	0.689	0.163
Environmental attitude	3.833	3.887	0.117
Panel C: Psychological characteristics			
Social desirability	3.966	3.989	0.212
Locus of control	5.143	5.216	0.067
Panel D: Meat consumption			
Baseline meat consumption	4.348	4.300	0.666
Meals with meat past 7 days	6.593	6.495	0.616
Reduced meat consumption	0.678	0.663	0.431
Consumption below average	0.646	0.658	0.522
Intention	2.964	2.872	0.039
Attitude	4.114	4.194	0.023
Perceived behavioral control	3.991	4.032	0.132
Meat-eater identity	2.877	2.802	0.078
Injunctive norm	2.277	2.270	0.870
Descriptive norm	29.292	30.598	0.195
Stage of change			
Precontemplation	0.238	0.264	0.117
Contemplation	0.050	0.045	0.560
Preparation	0.034	0.027	0.271
Action	0.678	0.664	0.436
Reasons for reduction			
Animal welfare	0.853	0.860	0.642
Environment	0.781	0.825	0.013
Health	0.906	0.909	0.826
Curiosity	0.132	0.116	0.278
Social pressure	0.062	0.055	0.513
Financial reasons	0.271	0.274	0.892
Characterize diet			
Satisfaction	0.680	0.715	0.046
Healthy	0.461	0.493	0.105
Environmentally friendly	0.610	0.640	0.101
Share of self-made meals	77.139	79.531	0.010
Barriers to reduction			
No idea for meal	0.142	0.116	0.043
Lack of cooking skills	0.168	0.130	0.006
No time	0.125	0.077	0.000
Eating out	0.097	0.089	0.469
Too complicated	0.137	0.107	0.016
Do not get full	0.116	0.095	0.066
Tradition	0.455	0.439	0.402
Peers	0.040	0.041	0.900
Not miss taste	0.626	0.605	0.267
Too expensive	0.095	0.081	0.190
Habit	0.351	0.289	0.001
Carbon knowledge	1.794	1.832	0.431
Number of observations	1334	1418	2752

Figure A.1: Distribution of overall meat consumption in the estimation sample (a) before and (b) after cleaning of outliers

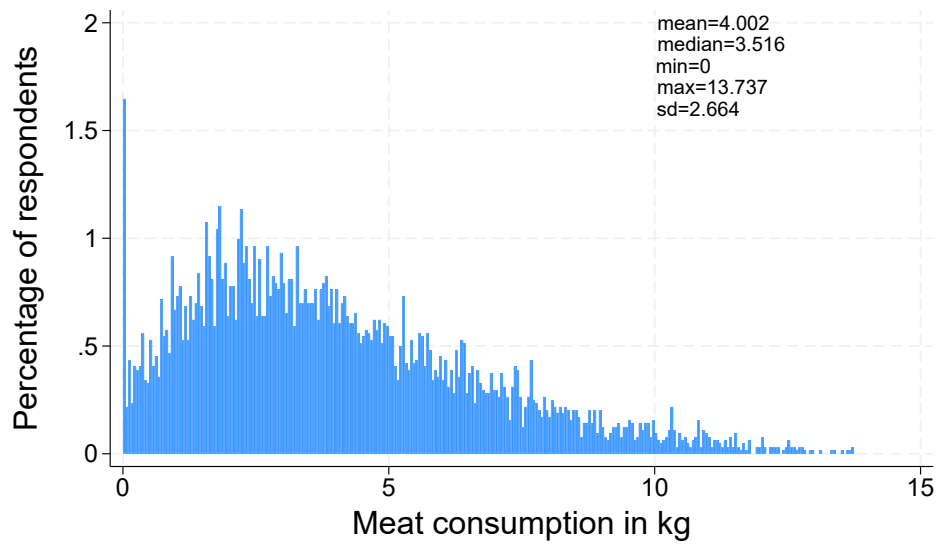
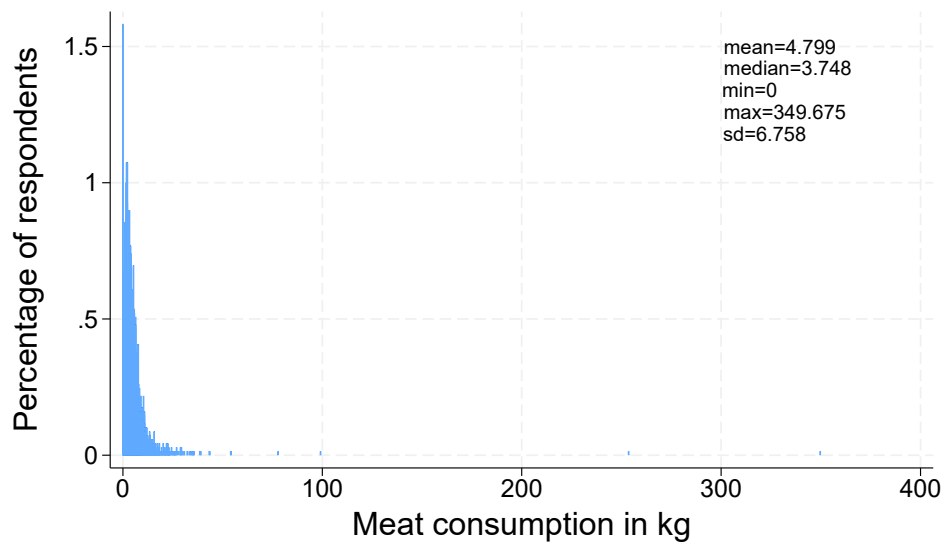


Table A.3: Baseline meat consumption

	Total															
	Control				Information				Support				Combined			
	mean	std. dev.	min	max	mean	std. dev.	min	max	mean	std. dev.	min	max	mean	std. dev.	min	max
Kilograms																
Pastmonth total	4.3	2.8	0.0	13.7	4.3	2.9	0.0	13.5	4.4	2.9	0.1	13.7	4.1	2.6	0.0	12.1
Cold cuts	0.6	0.7	0.0	4.6	0.6	0.6	0.0	4.6	0.6	0.6	0.0	4.6	0.6	0.7	0.0	4.6
Bratwurst	0.5	0.7	0.0	4.0	0.5	0.6	0.0	4.0	0.6	0.7	0.0	4.0	0.5	0.6	0.0	4.0
Steak	0.8	0.9	0.0	5.2	0.8	0.8	0.0	4.4	0.9	1.0	0.0	5.2	0.8	0.9	0.0	5.2
Poultry	1.0	1.1	0.0	6.4	1.0	1.0	0.0	5.5	1.0	1.1	0.0	6.4	1.0	1.2	0.0	6.4
Kebab	0.2	0.4	0.0	2.9	0.3	0.4	0.0	2.2	0.2	0.4	0.0	2.9	0.2	0.4	0.0	2.5
Pizza	0.1	0.1	0.0	1.0	0.1	0.1	0.0	0.7	0.1	0.1	0.0	1.0	0.1	0.1	0.0	1.0
Salads	0.8	0.9	0.0	3.6	0.8	0.9	0.0	3.6	0.8	0.9	0.0	3.6	0.8	0.8	0.0	3.6
Snacks	0.2	0.5	0.0	2.9	0.2	0.6	0.0	2.9	0.2	0.5	0.0	2.9	0.2	0.5	0.0	2.9
Number of portions																
Pastmonth total	46.0	33.7	0.0	204.0	45.5	33.1	0.0	195.5	46.1	33.1	0.2	199.7	44.6	31.4	0.0	199.7
Cold cuts	20.3	23.1	0.0	152.1	19.7	20.6	0.0	152.1	19.6	21.5	0.0	152.1	20.0	23.4	0.0	152.1
Bratwurst	4.1	5.3	0.0	30.4	4.0	4.5	0.0	30.4	4.2	5.6	0.0	30.4	3.7	4.5	0.0	30.4
Steak	4.8	5.3	0.0	30.4	4.5	4.9	0.0	26.0	5.1	5.6	0.0	30.4	4.7	5.2	0.0	30.4
Poultry	4.7	5.2	0.0	30.4	4.7	4.7	0.0	26.0	4.8	5.3	0.0	30.4	4.6	5.5	0.0	30.4
Kebab	1.4	2.3	0.0	17.3	1.6	2.4	0.0	13.0	1.4	2.3	0.0	17.3	1.3	2.1	0.0	15.2
Pizza	1.9	2.6	0.0	17.3	1.9	2.5	0.0	13.0	1.8	2.4	0.0	17.3	1.9	2.6	0.0	17.3
Mixed dishes	6.6	7.2	0.0	30.4	6.6	7.4	0.0	30.4	6.6	7.1	0.0	30.4	6.4	7.0	0.0	30.4
Snacks	2.2	5.1	0.0	30.4	2.6	5.8	0.0	30.4	2.5	5.0	0.0	30.4	2.0	4.9	0.0	30.4

Table A.4: Balance Table

	Total	Control (1)	Info (2)	Support (3)	Combined (4)	1 vs 2 (p)	1 vs 3 (p)	1 vs 4 (p)
Panel A: Socioeconomic and demographic characteristics								
Gender								
male	0.581	0.594	0.567	0.554	0.611	0.469	0.280	0.656
female	0.417	0.406	0.433	0.444	0.387	0.469	0.314	0.603
non-binary	0.001	0.000	0.000	0.003	0.003	.	0.333	0.329
Age	60.358	60.618	59.374	60.862	60.585	0.241	0.820	0.976
At least technical college	0.410	0.438	0.364	0.413	0.427	0.046	0.499	0.770
Employed	0.474	0.456	0.522	0.435	0.483	0.079	0.582	0.468
Has children	0.628	0.618	0.637	0.595	0.661	0.600	0.541	0.233
Net hh income								
<1,200 Euro	0.063	0.051	0.064	0.082	0.055	0.466	0.115	0.832
1,200 - 2,700 Euro	0.323	0.341	0.325	0.313	0.313	0.676	0.455	0.455
2,700 - 4,200 Euro	0.313	0.280	0.322	0.340	0.307	0.250	0.100	0.458
> 4,200 Euro	0.301	0.328	0.288	0.264	0.325	0.278	0.078	0.940
Panel B: Environmental attitudes								
Climate change attitudes								
Does not exist	0.044	0.033	0.059	0.058	0.025	0.102	0.107	0.572
Natural	0.043	0.039	0.031	0.053	0.048	0.572	0.376	0.543
Natural and anthropogenic	0.225	0.211	0.251	0.224	0.212	0.204	0.662	0.970
Anthropogenic	0.689	0.718	0.659	0.665	0.715	0.094	0.128	0.921
Environmental attitude	3.887	3.836	3.862	3.939	3.906	0.706	0.110	0.306
Panel C: Psychological characteristics								
Social desirability	3.989	3.944	4.004	4.017	3.988	0.120	0.044	0.247
Locus of control	5.216	5.166	5.158	5.298	5.238	0.918	0.067	0.338
Panel D: Meat consumption								
Baseline meat consumption	4.300	4.282	4.389	4.141	4.390	0.644	0.521	0.647
Meals with meat past 7 days	6.495	6.423	6.335	6.717	6.499	0.820	0.458	0.850
Reduced meat consumption	0.663	0.688	0.632	0.704	0.630	0.118	0.664	0.105
Consumption below average	0.658	0.660	0.628	0.682	0.661	0.388	0.541	0.972
Intention	2.872	2.864	2.859	2.895	2.871	0.953	0.713	0.937
Attitude	4.194	4.237	4.148	4.208	4.185	0.181	0.654	0.437
Perceived behavioral control	4.032	3.970	4.012	4.070	4.073	0.454	0.065	0.063
Meat-eater identity	2.802	2.789	2.838	2.749	2.834	0.568	0.634	0.607
Injunctive norm	2.270	2.309	2.298	2.207	2.272	0.889	0.205	0.644
Descriptive norm	30.598	30.437	28.302	30.745	32.965	0.287	0.877	0.245
Stage of change								
Precontemplation	0.264	0.227	0.285	0.247	0.295	0.079	0.529	0.043
Contemplation	0.045	0.057	0.059	0.033	0.031	0.884	0.136	0.101
Preparation	0.027	0.024	0.025	0.017	0.042	0.896	0.499	0.175
Action	0.664	0.693	0.630	0.703	0.632	0.083	0.769	0.092
Reasons for reduction								
Animal welfare	0.860	0.847	0.857	0.872	0.862	0.750	0.410	0.628
Environment	0.825	0.831	0.774	0.831	0.863	0.104	0.998	0.318
Health	0.909	0.922	0.897	0.915	0.899	0.320	0.748	0.351
Curiosity	0.116	0.112	0.138	0.109	0.107	0.379	0.913	0.884
Social pressure	0.055	0.059	0.031	0.075	0.053	0.133	0.471	0.747
Financial reasons	0.274	0.271	0.294	0.244	0.290	0.565	0.494	0.623
Characterize diet								
Satisfaction	0.715	0.690	0.698	0.735	0.737	0.818	0.193	0.176
Healthy	0.493	0.494	0.471	0.507	0.499	0.554	0.733	0.904
Environmentally friendly	0.640	0.620	0.626	0.684	0.629	0.866	0.076	0.806
Share of self-made meals	79.531	79.268	78.095	80.279	80.445	0.525	0.569	0.508
Barriers to reduction								
No idea for meal	0.116	0.158	0.119	0.101	0.088	0.145	0.025	0.005
Lack of cooking skills	0.130	0.150	0.131	0.106	0.133	0.473	0.083	0.524
No time	0.077	0.108	0.065	0.075	0.062	0.048	0.136	0.032
Eating out	0.089	0.094	0.070	0.111	0.082	0.262	0.461	0.598
Too complicated	0.107	0.132	0.108	0.106	0.082	0.331	0.292	0.035
Do not get full	0.095	0.101	0.088	0.091	0.099	0.549	0.672	0.920
Tradition	0.439	0.444	0.437	0.436	0.441	0.850	0.838	0.935
Peers	0.041	0.042	0.049	0.034	0.040	0.671	0.547	0.905
Not miss taste	0.605	0.598	0.615	0.593	0.614	0.637	0.908	0.658
Too expensive	0.081	0.071	0.069	0.109	0.074	0.916	0.084	0.894
Habit	0.289	0.315	0.276	0.294	0.274	0.257	0.532	0.233
Carbon knowledge	1.832	1.893	1.757	1.807	1.872	0.147	0.355	0.822
Number of observations	1418	340	358	363	357	698	703	697

Table A.5: Intentions, attitudes, norms, motives, and habits with respect to meat consumption and general attitudes and characteristics

Variable	Description	Mean	Std. dev.	Min.	Max.
Panel A: Environmental attitudes					
Climate change attitudes	Categorical variable for attitudes about existence and cause of climate change [questions Klima1, Klima2]				
Does not exist		4.40		0	100
Natural		4.26		0	100
Natural and anthropogenic		22.48		0	100
Anthropogenic		68.87		0	100
Environmental attitudes	Index for environmental attitudes [question PK2]	3.89	0.89	1	5
Panel B: Psychological characteristics					
Locus of control	Index for internal locus of control [question PK4]	5.22	1.01	1	7
Social desirability	Index for social desirability [question PK5]	3.99	0.49	1.83	5
Panel C: Meat consumption					
Intention	Index for intention to reduce meat consumption [question F7, items 1-3]	2.87	1.14	1	5
Attitude	Index for attitude toward reducing meat consumption [question F6]	4.19	0.89	1	5
Perceived behavioral control	Index for perceived behavioral control over reducing meat consumption [question F7, items 7-9]	4.03	0.71	1	5
Meat-eater identity	Index for meat-eater identity [question F7, items 10-11]	2.80	1.14	1	5
Injunctive norm	Index for whether peers would approve of reducing meat consumption [question F7, items 4-6]	2.27	1.02	1	5
Descriptive norm	Proportion of peers with meatless diet [question F8]	30.60	25.76	1	100
Stage of change	Proportion of respondents in the following positions of the behavior change process [questions F5a, F5b]				
Pre-contemplation		26.39		0	100
Contemplation		4.49		0	100
Preparation		2.71		0	100
Action		66.41		0	100
Self-made meals	Proportion of self-made meals [questions F2a_1, F2a_2, F2b_1, F2b_2]	79.53	23.09	0	100
Reduced meat	Proportion of respondents having reduced their meat consumption in the past [question F4]	66.34		0	100
Meat below average	Proportion of respondents considering their meat consumption to be below average [question F3]	65.76		0	100
Satisfaction	Proportion of respondents satisfied with their diet [question F00a]	71.54		0	100
Diet environmental	Proportion of respondents considering their diet to be environmentally friendly [question F00b, item 1]	49.28		0	100
Diet healthy	Proportion of respondents considering their diet to be healthy [question F00b, item 2]	64.04		0	100
Reasons	Proportions of respondents naming reasons for reducing meat consumption [question F9]				
Animal welfare		85.98		0	100
Environment/climate		82.50		0	100
Health		90.86		0	100
Curiosity		11.62		0	100
Social pressure		5.49		0	100
Financial reasons		27.41		0	100
Barriers	Proportions of respondents naming barriers to the reduction of meat consumption [question F10]				
No idea for meal		11.58		0	100
Lack skills		12.97		0	100
No time		7.73		0	100
Eating out		8.92		0	100
Too complicated		10.68		0.00	100
Do not get full		9.45		0	100
Tradition		43.92		0	100
Peers		4.13		0	100
Not miss taste		60.51		0	100
Too expensive		8.11		0	100
Habit		28.95		0	100
Carbon knowledge	Index for knowledge about carbon emissions of meat products (beef, pork, chicken) compared to vegetarian groceries [question F11]	1.83	1.08	0	3

Note: Indices are build by coding all items so that a higher value corresponds to a higher score on the scale and then taking the average over all items; all items/questions referred to in the table can be found in the questionnaire in the Supplementary Materials, Section 3.

Table A.6: OLS regression of baseline meat consumption on respondents' characteristics and attitudes

	Coeff.	SE	95% CI
Gender (ref: male)			
female	-0.472*	(0.185)	[-0.836,-0.109]
non-binary	-1.304	(0.701)	[-2.681,0.072]
Age (ref: 45-64)			
18-29	-0.651	(0.455)	[-1.544,0.242]
30-44	-0.486	(0.249)	[-0.975,0.002]
≥ 65	0.411*	(0.194)	[0.029,0.792]
College degree	-0.783***	(0.179)	[-1.134,-0.431]
Has children	0.155	(0.190)	[-0.217,0.527]
Net income of hh (ref: 2,700 – 4,200 Euro)			
< 1,200 Euro	-0.709	(0.462)	[-1.616,0.197]
1,200 – 2,700 Euro	-0.477*	(0.230)	[-0.929,-0.025]
2,700 – 4,200 Euro	-0.251	(0.207)	[-0.657,0.154]
Climate change attitudes (ref: anthropogenic)			
doesn't exist	0.000	(0.473)	[-0.929,0.929]
natural	-0.376	(0.555)	[-1.465,0.713]
both	0.267	(0.250)	[-0.224,0.759]
Environ attitude	-0.021	(0.126)	[-0.269,0.226]
Social desirability	0.022	(0.192)	[-0.355,0.400]
Internal locus of control	-0.044	(0.091)	[-0.222,0.135]
Reduced meat consumption	-0.079	(0.239)	[-0.548,0.389]
Consumption below average	0.572***	(0.145)	[0.288,0.856]
Intention to reduce	0.050	(0.101)	[-0.149,0.249]
Attitudes toward reduction	-0.363*	(0.147)	[-0.651,-0.075]
Perceived behavioral control	0.048	(0.135)	[-0.218,0.313]
Meat-eater identity	0.279*	(0.117)	[0.050,0.507]
Injunctive norm	0.153	(0.098)	[-0.039,0.344]
Descriptive norm	-0.008*	(0.004)	[-0.015,-0.001]
Contemplation	0.144	(0.540)	[-0.917,1.204]
Preparation	0.901	(0.598)	[-0.272,2.074]
Satisfied with diet	-0.033	(0.129)	[-0.287,0.221]
Diet environmentally friendly	-0.120	(0.142)	[-0.398,0.158]
Diet healthy	0.018	(0.159)	[-0.295,0.330]
Share selfmade meals	-0.010*	(0.005)	[-0.019,-0.000]
Number of barriers	0.062***	(0.017)	[0.028,0.096]
Habit as barrier	0.288	(0.248)	[-0.199,0.775]
Carbon knowledge	-0.117	(0.083)	[-0.280,0.046]
Constant	4.203**	(1.415)	[1.425,6.980]
No. of observations		745	

Note: Robust standard errors; *, ** and *** indicate statistical significance at the 5%, 1% and 0.1% level, respectively.

B Sub-sample comparisons

Table B.1: Comparison of participants with different levels of newsletter uptake

	Acceptance of NL			Clicked on link to full NL			Reported to have read NL		
	No	Yes	p-val	No	Yes	p-val	No	Yes	p-val
Panel A: Socioeconomic and demographic characteristics									
Gender									
male	0.592	0.548	0.150	0.611	0.556	0.034	0.646	0.565	0.055
female	0.406	0.452	0.133	0.385	0.444	0.025	0.354	0.433	0.062
non-binary	0.002	0.000	0.416	0.003	0.000	0.122	0.000	0.002	0.554
Age	59.686	62.395	0.002	60.975	59.842	0.131	61.472	60.067	0.240
At least technical college	0.416	0.393	0.439	0.428	0.395	0.212	0.401	0.401	1.000
Employed	0.492	0.422	0.023	0.435	0.506	0.008	0.425	0.490	0.131
Has children	0.624	0.639	0.605	0.596	0.654	0.024	0.578	0.640	0.130
Net hh income									
<1,200 Euro	0.061	0.070	0.539	0.081	0.049	0.020	0.122	0.058	0.005
1,200 - 2,700 Euro	0.311	0.358	0.118	0.316	0.329	0.617	0.281	0.323	0.319
2,700 - 4,200 Euro	0.316	0.303	0.651	0.307	0.317	0.687	0.360	0.317	0.321
> 4,200 Euro	0.312	0.269	0.143	0.297	0.305	0.750	0.237	0.302	0.122
Panel B: Environmental attitudes									
Climate change attitudes									
Does not exist	0.041	0.054	0.278	0.044	0.044	0.980	0.082	0.042	0.028
Natural	0.046	0.031	0.235	0.049	0.038	0.313	0.057	0.042	0.393
Natural and anthropogenic	0.223	0.231	0.733	0.232	0.219	0.579	0.252	0.225	0.469
Anthropogenic	0.691	0.683	0.787	0.676	0.699	0.353	0.610	0.691	0.042
Environmental attitude	3.869	3.941	0.183	3.827	3.936	0.022	3.790	3.922	0.088
Panel C: Psychological characteristics									
Social desirability	3.982	4.011	0.342	3.965	4.009	0.090	4.025	3.999	0.548
Locus of control	5.219	5.206	0.844	5.175	5.249	0.179	5.211	5.235	0.793
Panel D: Meat consumption									
Baseline meat consumption	4.367	4.111	0.156	4.329	4.276	0.740	4.520	4.272	0.348
Meals with meat past 7 days	6.521	6.419	0.748	6.454	6.529	0.789	6.513	6.519	0.991
Reduced meat consumption	0.656	0.685	0.328	0.659	0.667	0.773	0.614	0.663	0.234
Consumption below average	0.654	0.668	0.651	0.646	0.667	0.413	0.637	0.660	0.568
Intention	2.889	2.820	0.324	2.836	2.902	0.281	2.786	2.890	0.291
Attitude	4.186	4.217	0.580	4.183	4.203	0.679	4.085	4.197	0.158
Perceived behavioral control	4.016	4.083	0.130	3.971	4.084	0.003	3.932	4.073	0.019
Meat-eater identity	2.839	2.690	0.033	2.827	2.782	0.461	2.821	2.804	0.863
Injunctive norm	2.290	2.212	0.230	2.302	2.245	0.311	2.290	2.253	0.682
Descriptive norm	30.108	32.031	0.246	30.756	30.476	0.847	30.067	30.741	0.778
Stage of change									
Precontemplation	0.272	0.239	0.215	0.272	0.257	0.510	0.340	0.265	0.052
Contemplation	0.046	0.040	0.625	0.044	0.046	0.890	0.026	0.044	0.289
Preparation	0.024	0.037	0.175	0.022	0.031	0.289	0.019	0.030	0.468
Action	0.657	0.684	0.366	0.661	0.666	0.849	0.615	0.662	0.259
Reasons for reduction									
Animal welfare	0.856	0.871	0.554	0.847	0.870	0.294	0.874	0.863	0.757
Environment	0.832	0.805	0.331	0.821	0.829	0.736	0.835	0.821	0.731
Health	0.904	0.921	0.425	0.907	0.910	0.885	0.904	0.904	0.999
Curiosity	0.121	0.102	0.396	0.114	0.118	0.850	0.150	0.113	0.284
Social pressure	0.063	0.030	0.042	0.057	0.053	0.778	0.049	0.054	0.812
Financial reasons	0.293	0.221	0.024	0.288	0.263	0.365	0.330	0.267	0.182
Characterize diet									
Satisfaction	0.709	0.736	0.328	0.705	0.724	0.427	0.713	0.725	0.741
Healthy	0.486	0.513	0.386	0.483	0.501	0.486	0.516	0.488	0.523
Environmentally friendly	0.633	0.662	0.336	0.617	0.660	0.091	0.606	0.654	0.245
Share of self-made meals	78.967	81.233	0.123	79.350	79.677	0.798	79.278	79.670	0.853
Barriers to reduction									
No idea for meal	0.119	0.107	0.539	0.134	0.101	0.052	0.090	0.105	0.569
Lack of cooking skills	0.121	0.156	0.098	0.134	0.126	0.661	0.089	0.129	0.159
No time	0.080	0.069	0.504	0.085	0.070	0.298	0.057	0.069	0.577
Eating out	0.094	0.074	0.264	0.096	0.084	0.432	0.084	0.089	0.850
Too complicated	0.105	0.112	0.730	0.116	0.099	0.320	0.103	0.098	0.867
Do not get full	0.095	0.094	0.986	0.108	0.083	0.120	0.108	0.090	0.479
Tradition	0.445	0.423	0.477	0.452	0.429	0.395	0.439	0.438	0.963
Peers	0.041	0.044	0.802	0.041	0.041	0.974	0.038	0.041	0.865
Not miss taste	0.614	0.579	0.246	0.598	0.611	0.640	0.563	0.615	0.218
Too expensive	0.086	0.066	0.252	0.087	0.076	0.478	0.084	0.084	0.992
Habit	0.295	0.273	0.435	0.287	0.292	0.842	0.253	0.286	0.395
Carbon knowledge	1.810	1.896	0.251	1.830	1.833	0.957	1.608	1.840	0.047
Number of observations	1066	352	1418	646	772	1418	161	917	1078

Note: P-values from two-sample t-tests for sub-group comparisons.

Table B.2: Comparison of participants with below and above median baseline meat consumption

	Below median	Above median	Comparison (p)
Panel A: Socioeconomic and demographic characteristics			
Gender			
male	0.459	0.670	0.000
female	0.538	0.330	0.000
non-binary	0.003	0.000	0.158
Age	60.407	60.174	0.772
At least technical college	0.477	0.371	0.000
Has children	0.653	0.620	0.212
Net hh income			
<1,200 Euro	0.074	0.049	0.074
1,200 - 2,700 Euro	0.315	0.328	0.649
2,700 - 4,200 Euro	0.308	0.310	0.941
> 4,200 Euro	0.303	0.314	0.696
Panel B: Environmental attitudes			
Climate change attitudes			
Does not exist	0.043	0.045	0.886
Natural	0.025	0.049	0.025
Natural and anthropogenic	0.181	0.253	0.002
Anthropogenic	0.750	0.653	0.000
Environmental attitude	4.092	3.769	0.000
Panel C: Psychological characteristics			
Social desirability	4.043	3.951	0.001
Locus of control	5.291	5.158	0.022
Panel D: Meat consumption			
Baseline meat consumption	2.058	6.544	0.000
Meals with meat past 7 days	4.016	8.410	0.000
Reduced meat consumption	0.774	0.587	0.000
Consumption below average	0.878	0.475	0.000
Intention	2.949	2.848	0.114
Attitude	4.465	3.997	0.000
Perceived behavioral control	4.128	3.983	0.000
Meat-eater identity	2.239	3.229	0.000
Injunctive norm	2.187	2.327	0.018
Descriptive norm	38.606	23.855	0.000
Stage of change			
Precontemplation	0.185	0.312	0.000
Contemplation	0.021	0.068	0.000
Preparation	0.021	0.032	0.207
Action	0.774	0.588	0.000
Characterize diet			
Satisfaction	0.764	0.670	0.000
Healthy	0.625	0.377	0.000
Environmentally friendly	0.734	0.570	0.000
Share of self-made meals	82.497	77.240	0.000
Barriers to reduction			
No idea for meal	0.057	0.159	0.000
Lack of cooking skills	0.085	0.167	0.000
No time	0.037	0.106	0.000
Eating out	0.060	0.113	0.001
Too complicated	0.053	0.149	0.000
Do not get full	0.035	0.142	0.000
Tradition	0.291	0.562	0.000
Peers	0.032	0.049	0.144
Not miss taste	0.490	0.704	0.000
Too expensive	0.043	0.114	0.000
Habit	0.177	0.403	0.000
Carbon knowledge	1.608	1.840	0.047
Panel E: Newsletter uptake			
Opened NL	0.269	0.258	0.667
Read NL	0.549	0.571	0.443
Number NL opened	0.579	0.517	0.349
Number NL read	3.690	3.353	0.066
Number of observations	632	631	1263

C Regression tables for main results

Table C.1: Difference-in-differences regression with dynamic treatment effects and individual and time-fixed effects of overall absolute meat consumption in kilogram on treatment assignment

	Coeff.	SE	95% CI
Follow-up 1	-0.169	(0.126)	[-0.416,0.078]
Follow-up 2	-0.282*	(0.137)	[-0.552,-0.013]
Follow-up 3	-0.286*	(0.138)	[-0.557,-0.016]
Follow-up 4	-0.129	(0.148)	[-0.420,0.162]
Info x FU1	0.040	(0.186)	[-0.325,0.405]
Info x FU2	-0.003	(0.183)	[-0.361,0.355]
Info x FU3	-0.189	(0.193)	[-0.569,0.190]
Info x FU4	-0.108	(0.202)	[-0.504,0.288]
Support x FU1	-0.058	(0.178)	[-0.407,0.290]
Support x FU2	0.007	(0.183)	[-0.353,0.366]
Support x FU3	-0.330	(0.185)	[-0.693,0.033]
Support x FU4	-0.242	(0.194)	[-0.623,0.139]
Combined x FU1	-0.254	(0.175)	[-0.597,0.090]
Combined x FU2	-0.352	(0.191)	[-0.727,0.023]
Combined x FU3	-0.335	(0.193)	[-0.714,0.045]
Combined x FU4	-0.241	(0.197)	[-0.627,0.146]
Constant	4.281***	(0.043)	[4.196,4.365]
No. of observations		6436	

Note: Standard errors are clustered at the individual level and reported in parentheses; *, ** and *** indicate statistical significance at the 5%, 1% and 0.1% level, respectively. Wave coefficients report the time-fixed effects.

Table C.2: Difference-in-differences regression with pooled follow-up periods and individual and time-fixed effects of overall absolute meat consumption in kilogram on treatment assignment

	Coeff.	SE	95% CI
FU period	-0.148	(0.119)	[-0.382,0.085]
Info x FU period	-0.064	(0.154)	[-0.367,0.239]
Support x FU period	-0.154	(0.150)	[-0.449,0.140]
Combined x FU period	-0.295	(0.155)	[-0.599,0.009]
Follow-up 1	0.040	(0.064)	[-0.087,0.166]
Follow-up 2	-0.091	(0.062)	[-0.213,0.032]
Follow-up 3	-0.225**	(0.064)	[-0.351,-0.100]
Constant	4.281***	(0.043)	[4.196,4.365]
No. of observations		6436	

Note: Standard errors are clustered at the individual level and reported in parentheses; *, ** and *** indicate statistical significance at the 5%, 1% and 0.1% level, respectively. The coefficient on Follow-up period represents the difference in the control group between the baseline and the follow-up periods in terms of the difference between the baseline and the fourth follow-up period. The wave coefficients report the monthly-fixed effects in terms of deviations from the coefficient on Follow-up period .

Table C.3: Difference-in-differences regression with pooled follow-up periods and treatment groups and individual and time-fixed effects of overall absolute meat consumption in kilogram on treatment assignment

	Coeff.	SE	95% CI
Follow-up period	-0.149	(0.119)	[-0.382,0.085]
Treated x FU period	-0.170	(0.126)	[-0.418,0.077]
Follow-up 1	0.040	(0.064)	[-0.086,0.166]
Follow-up 2	-0.090	(0.062)	[-0.213,0.032]
Follow-up 3	-0.225***	(0.064)	[-0.350,-0.099]
Constant	4.281***	(0.043)	[4.196,4.365]
No. of observations		6436	

Note: Standard errors are clustered at the individual level and reported in parentheses; *, ** and *** indicate statistical significance at the 5%, 1% and 0.1% level, respectively. The coefficient on Follow-up period represents the difference in the control group between the baseline and the follow-up periods in terms of the difference between the baseline and the fourth follow-up period. The wave coefficients report the monthly-fixed effects in terms of deviations from the coefficient on Follow-up period .

Table C.4: Pooled OLS regression of meat consumption on treatment assignment controlling for baseline outcome

	Model I		Model II		Model III		Model IV	
	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE
Info	-0.043	(0.096)	-0.085	(0.098)	-0.081	(0.099)	-0.100	(0.113)
Support	-0.164	(0.092)	-0.164	(0.094)	-0.162	(0.095)	-0.248*	(0.111)
Combined	-0.201*	(0.092)	-0.208*	(0.094)	-0.199*	(0.095)	-0.155	(0.112)
Baseline meat consumption	0.681***	(0.014)	0.657***	(0.016)	0.657***	(0.016)	0.565***	(0.023)
Gender (ref: male)								
female	-	-	-0.287***	(0.071)	-0.294***	(0.072)	-0.192*	(0.090)
non-binary	-	-	-0.165	(0.234)	-0.201	(0.231)	-0.063	(0.264)
Age (ref: 45-64)								
18-29	-	-	-0.193	(0.196)	-0.059	(0.195)	0.096	(0.212)
30-44	-	-	-0.336**	(0.109)	-0.353**	(0.110)	-0.341**	(0.119)
≥ 65	-	-	-0.283***	(0.078)	-0.287***	(0.079)	-0.119	(0.097)
College degree	-	-	-0.154*	(0.070)	-0.153*	(0.071)	-0.189*	(0.082)
Has children	-	-	0.029	(0.076)	0.038	(0.077)	0.027	(0.088)
Net income of hh (ref: 2,700 – 4,200 Euro)								
< 1,200 Euro	-	-	0.187	(0.167)	0.206	(0.175)	0.107	(0.211)
1,200 – 2,700 Euro	-	-	0.161	(0.090)	0.159	(0.091)	0.097	(0.106)
2,700 – 4,200 Euro	-	-	0.089	(0.086)	0.097	(0.087)	0.060	(0.096)
Climate change attitudes (ref: anthropogenic)								
doesn't exist	-	-	0.259	(0.197)	0.285	(0.207)	0.178	(0.293)
natural	-	-	0.065	(0.246)	0.143	(0.248)	0.083	(0.336)
both	-	-	0.006	(0.097)	0.029	(0.097)	0.049	(0.116)
Environ attitude	-	-	-0.163***	(0.048)	-0.155**	(0.049)	-0.079	(0.058)
Internal locus of control	-	-	0.046	(0.035)	0.055	(0.036)	0.034	(0.045)
Social desirability	-	-	-	-	-0.077	(0.082)	-0.025	(0.096)
Reduced meat consumption	-	-	-	-	-	-	0.284***	(0.112)
Consumption below average	-	-	-	-	-	-	0.150(0.419)	(0.068)
Intention to reduce	-	-	-	-	-	-	-0.012(0.192)	(0.052)
Attitudes toward reduction	-	-	-	-	-	-	-0.132	(0.075)
Perceived behavioral control	-	-	-	-	-	-	-0.097(0.136)	(0.059)
Meat-eater identity	-	-	-	-	-	-	0.158**	(0.059)
Injunctive norm	-	-	-	-	-	-	-0.005	(0.047)
Descriptive norm	-	-	-	-	-	-	-0.001	(0.002)
Contemplation	-	-	-	-	-	-	0.155	(0.225)
Preparation	-	-	-	-	-	-	-0.322	(0.292)
Satisfied with diet	-	-	-	-	-	-	0.017	(0.059)
Diet environmentally friendly	-	-	-	-	-	-	0.013	(0.066)
Diet healthy	-	-	-	-	-	-	-0.039	(0.069)
Share selfmade meals	-	-	-	-	-	-	-0.002	(0.002)
Number of barriers	-	-	-	-	-	-	0.002	(0.009)
Habit as barrier	-	-	-	-	-	-	0.113	(0.109)
Carbon knowledge	-	-	-	-	-	-	-0.053	(0.038)
Constant	1.167***	(0.083)	1.937***	(0.305)	2.158***	(0.444)	1.283	(0.697)
No. of observations		586		5198		5111		3500

Note: Standard errors are clustered at the individual level; *, **, and *** indicate statistical significance at the 5%, 1% and 0.1% level, respectively.

D Alternative outcome measures

Table D.1: Difference-in-differences regression with dynamic treatment effects and individual and time-fixed effects of meat consumption in kilogram on treatment assignment by category

	Cold cuts		Bratwurst		Steak		Poultry		Kebab		Pizza		Salads		Snacks		Main dishes		Breakfast & Snacks	
	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE
Follow-up 1	0.077*	(0.036)	-0.000	(0.040)	0.102*	(0.049)	-0.081	(0.060)	0.020	(0.027)	-0.008	(0.009)	-0.237***	(0.050)	-0.041	(0.034)	-0.043	(0.148)	0.078	(0.055)
Follow-up 2	-0.014	(0.032)	-0.028	(0.043)	0.085	(0.053)	-0.024	(0.060)	-0.040	(0.026)	-0.014	(0.010)	-0.191***	(0.046)	0.012	(0.037)	-0.156	(0.148)	0.034	(0.054)
Follow-up 3	0.059	(0.032)	-0.091*	(0.041)	-0.039	(0.054)	-0.004	(0.064)	-0.002	(0.029)	-0.012	(0.009)	-0.259***	(0.052)	-0.006	(0.031)	-0.212	(0.146)	0.073	(0.051)
Follow-up 4	0.051	(0.038)	0.007	(0.042)	0.023	(0.054)	-0.059	(0.058)	0.011	(0.028)	-0.014	(0.010)	-0.125*	(0.056)	-0.023	(0.032)	-0.268	(0.158)	-0.009	(0.053)
Info x FU1	0.003	(0.054)	-0.006	(0.056)	-0.188*	(0.074)	0.046	(0.087)	0.034	(0.037)	0.017	(0.013)	0.086	(0.072)	0.048	(0.047)	-0.095	(0.210)	0.019	(0.078)
Info x FU2	0.074	(0.052)	-0.032	(0.061)	-0.156*	(0.077)	-0.051	(0.084)	0.091*	(0.036)	0.018	(0.013)	0.067	(0.068)	-0.014	(0.047)	-0.179	(0.204)	0.004	(0.075)
Info x FU3	0.027	(0.049)	-0.086	(0.056)	-0.140	(0.081)	-0.043	(0.090)	0.066	(0.041)	0.016	(0.013)	-0.025	(0.072)	-0.004	(0.044)	-0.324	(0.202)	-0.033	(0.073)
Info x FU4	-0.046	(0.054)	-0.049	(0.060)	-0.096	(0.080)	0.053	(0.091)	-0.001	(0.038)	0.011	(0.013)	0.009	(0.076)	0.010	(0.044)	-0.208	(0.213)	-0.078	(0.075)
Support x FU1	0.012	(0.056)	-0.058	(0.055)	-0.146*	(0.068)	-0.028	(0.088)	0.016	(0.035)	-0.004	(0.013)	0.069	(0.071)	0.077	(0.047)	-0.324	(0.191)	0.005	(0.077)
Support x FU2	0.043	(0.049)	-0.020	(0.059)	-0.100	(0.074)	-0.006	(0.090)	0.059	(0.036)	-0.004	(0.013)	0.061	(0.067)	-0.026	(0.049)	-0.068	(0.198)	-0.007	(0.077)
Support x FU3	-0.057	(0.050)	0.017	(0.057)	-0.104	(0.073)	-0.167	(0.089)	0.019	(0.039)	-0.014	(0.013)	-0.018	(0.074)	-0.006	(0.044)	-0.356	(0.193)	-0.073	(0.073)
Support x FU4	-0.074	(0.052)	-0.075	(0.059)	-0.093	(0.073)	-0.003	(0.087)	-0.002	(0.037)	-0.000	(0.013)	-0.022	(0.078)	0.028	(0.046)	-0.263	(0.204)	-0.030	(0.069)
Combined x FU1	-0.044	(0.052)	-0.087	(0.062)	-0.176*	(0.078)	-0.020	(0.082)	0.032	(0.036)	0.006	(0.013)	-0.022	(0.072)	0.057	(0.045)	-0.232	(0.206)	-0.004	(0.073)
Combined x FU2	0.013	(0.051)	-0.116	(0.063)	-0.226**	(0.076)	-0.047	(0.087)	0.053	(0.036)	0.014	(0.013)	-0.025	(0.073)	-0.018	(0.046)	-0.460*	(0.210)	-0.083	(0.074)
Combined x FU3	-0.072	(0.049)	-0.142*	(0.065)	0.010	(0.079)	-0.131	(0.091)	0.010	(0.037)	0.002	(0.013)	-0.045	(0.074)	0.032	(0.047)	-0.290	(0.202)	-0.051	(0.074)
Combined x FU4	-0.064	(0.055)	-0.154*	(0.061)	-0.010	(0.080)	0.023	(0.086)	-0.009	(0.038)	0.007	(0.013)	-0.066	(0.077)	0.032	(0.044)	-0.077	(0.221)	-0.002	(0.076)
Constant	0.600***	(0.012)	0.540***	(0.014)	0.810***	(0.017)	0.985***	(0.021)	0.232***	(0.008)	0.108***	(0.003)	0.790***	(0.017)	0.216***	(0.010)	3.097***	(0.047)	0.730***	(0.017)
No. of observations	6436		6435		6436		6436		6436		6436		6436		6436		6436		7228	

Note: Standard errors are clustered at the individual level and reported in parentheses. *, **, and *** indicate statistical significance at the 5%, 1% and 0.1% level, respectively.

E Average treatment effect on the treated

Table E.1: First stage results of IV regression for ATT estimation, instrument: newsletter assignment, instrumented variables: factual click-data on opening of at least one newsletter & self-reported data on reading at least one newsletter

	Opened full newsletter						Reported to have read newsletter					
	Information		Support		Combined		Information		Support		Combined	
	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE
Info	0.402***	(0.024)	0.000	(0.022)	-0.000	(0.021)	0.721***	(0.022)	-0.000	(0.022)	0.000	(0.023)
Support	0.000	(0.024)	0.275***	(0.022)	-0.000	(0.021)	0.000	(0.022)	0.725***	(0.022)	0.000	(0.023)
Combined	0.000	(0.024)	0.000	(0.022)	0.244***	(0.021)	0.000	(0.022)	-0.000	(0.022)	0.679***	(0.023)
Constant	-0.000	(0.017)	-0.000	(0.016)	0.000	(0.015)	-0.000	(0.016)	0.000	(0.016)	-0.000	(0.017)
No. of observations	899		899		899		899		899		899	
F-statistic	149.308		83.697		71.067		573.219		583.610		467.842	
F-stat (p-val)	0.000		0.000		0.000		0.000		0.000		0.000	

Note: Homoskedastic standard errors are reported in parantheses; *, ** and *** indicate statistical significance at the 5%, 1% and 0.1% level, respectively.

Table E.2: Second stage results of IV regressions for ATT estimation, instrument: newsletter assignment, instrumented variables: factual click-data on opening of at least one newsletter & self-reported data on reading at least one newsletter

	Treated: opened full NL			Treated: reported to have read NL		
	Coeff.	SE	95% CI	Coeff.	SE	95% CI
Follow-up 1	-0.169	(0.130)	[-0.424,0.085]	-0.169	(0.130)	[-0.424,0.085]
Follow-up 2	-0.282*	(0.135)	[-0.547,-0.017]	-0.282*	(0.135)	[-0.547,-0.017]
Follow-up 3	-0.286*	(0.139)	[-0.560,-0.013]	-0.286*	(0.139)	[-0.560,-0.013]
Follow-up 4	-0.129	(0.149)	[-0.421,0.163]	-0.129	(0.149)	[-0.421,0.163]
Info x FU1	0.097	(0.460)	[-0.806,0.999]	0.056	(0.265)	[-0.463,0.574]
Info x FU2	-0.008	(0.432)	[-0.855,0.839]	-0.005	(0.248)	[-0.491,0.482]
Info x FU3	-0.455	(0.461)	[-1.359,0.450]	-0.261	(0.265)	[-0.781,0.258]
Info x FU4	-0.259	(0.475)	[-1.191,0.672]	-0.149	(0.273)	[-0.684,0.386]
Support x FU1	-0.194	(0.595)	[-1.360,0.973]	-0.082	(0.253)	[-0.578,0.413]
Support x FU2	0.022	(0.600)	[-1.155,1.199]	0.009	(0.255)	[-0.491,0.509]
Support x FU3	-1.094	(0.617)	[-2.304,0.116]	-0.465	(0.262)	[-0.979,0.049]
Support x FU4	-0.802	(0.655)	[-2.087,0.482]	-0.341	(0.278)	[-0.887,0.205]
Combined x FU1	-1.031	(0.728)	[-2.457,0.395]	-0.368	(0.260)	[-0.878,0.141]
Combined x FU2	-1.432	(0.786)	[-2.971,0.108]	-0.511	(0.281)	[-1.061,0.038]
Combined x FU3	-1.362	(0.769)	[-2.870,0.146]	-0.486	(0.275)	[-1.025,0.052]
Combined x FU4	-0.979	(0.806)	[-2.558,0.600]	-0.350	(0.288)	[-0.914,0.214]
Constant	4.281***	(0.076)	[4.132,4.429]	4.281***	(0.076)	[4.132,4.429]
No. of observations	6436			6436		

Note: Robust standard errors in parentheses; *, ** and *** indicate statistical significance at the 5%, 1% and 0.1% level, respectively.

F Heterogeneity

Table F.1: Difference-in-differences regression with individual and time fixed effects of meat consumption in kilogram on treatment assignment - baseline consumption heterogeneity

	below median		above median	
	Coeff.	SE	Coeff.	SE
(Post-)Intervention period	0.749***	(0.098)	-1.320***	(0.163)
Info x Post	-0.267	(0.142)	0.252	(0.236)
Support x Post	-0.452***	(0.131)	0.249	(0.235)
Combined x Post	-0.399**	(0.133)	0.003	(0.237)
Constant	2.030***	(0.037)	6.448***	(0.066)
No. of observations	3024		2842	

Note: Robust standard errors in parentheses; *, ** and *** indicate statistical significance at the 5%, 1% and 0.1% level, respectively.

Table F.2: Difference-in-differences regression with individual and time fixed effects of meat consumption in kilogram on treatment assignment for low baseline meat consumption - heterogeneity w.r.t. social desirability (SD)

	Low SDB		Medium SDB		High SDB		Comparison	
	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE
(Post-)Intervention period	0.849***	(0.169)	0.880***	(0.180)	0.583***	(0.168)	0.849***	(0.169)
Info x Post	-0.434	(0.243)	-0.337	(0.264)	-0.089	(0.250)	-0.434	(0.243)
Support x Post	-0.485*	(0.242)	-0.641**	(0.231)	-0.315	(0.221)	-0.485*	(0.241)
Combined x Post	-0.581*	(0.228)	-0.474*	(0.239)	-0.178	(0.231)	-0.581*	(0.228)
FU period x medium	-	-	-	-	-	-	0.031	(0.246)
FU period x high	-	-	-	-	-	-	-0.266	(0.238)
Info x FU period x medium	-	-	-	-	-	-	0.097	(0.358)
Info x FU period x high	-	-	-	-	-	-	0.345	(0.348)
Support x FU period x medium	-	-	-	-	-	-	-0.156	(0.334)
Support x FU period x high SD	-	-	-	-	-	-	0.170	(0.327)
Combined x FU period x medium SD	-	-	-	-	-	-	0.107	(0.330)
Combined x FU period x high SD	-	-	-	-	-	-	0.403	(0.324)
Constant	2.082***	(0.067)	1.916***	(0.067)	2.087***	(0.066)	2.030***	(0.038)
No. of observations	1035		948		950		2933	

Note: Robust standard errors in parentheses; *, ** and *** indicate statistical significance at the 5%, 1% and 0.1% level, respectively.

Table F.3: Difference-in-differences regression with individual and time fixed effects of meat consumption in kilogram on treatment assignment for high baseline meat consumption - heterogeneity w.r.t. social desirability (SD)

	Low SDB		Medium SDB		High SDB		Comparison	
	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE
(Post-)Intervention period	0.849***	(0.169)	0.880***	(0.180)	0.583***	(0.168)	0.849***	(0.169)
Info x Post	-0.434	(0.243)	-0.337	(0.264)	-0.089	(0.250)	-0.434	(0.243)
Support x Post	-0.485*	(0.242)	-0.641**	(0.231)	-0.315	(0.221)	-0.485*	(0.241)
Combined x Post	-0.581*	(0.228)	-0.474*	(0.239)	-0.178	(0.231)	-0.581*	(0.228)
FU period x medium	-	-	-	-	-	-	0.031	(0.246)
FU period x high	-	-	-	-	-	-	-0.266	(0.238)
Info x FU period x medium	-	-	-	-	-	-	0.097	(0.358)
Info x FU period x high	-	-	-	-	-	-	0.345	(0.348)
Support x FU period x medium	-	-	-	-	-	-	-0.156	(0.334)
Support x FU period x high SD	-	-	-	-	-	-	0.170	(0.327)
Combined x FU period x medium SD	-	-	-	-	-	-	0.107	(0.330)
Combined x FU period x high SD	-	-	-	-	-	-	0.403	(0.324)
Constant	2.082***	(0.067)	1.916***	(0.067)	2.087***	(0.066)	2.030***	(0.038)
No. of observations	1035		948		950		2933	

Note: Robust standard errors in parentheses; *, ** and *** indicate statistical significance at the 5%, 1% and 0.1% level, respectively.

Table F.4: OLS regression results for the comparison of baseline meat consumption between sub-groups with low, medium and high perceived injunctive norm

	Coeff.	SE
middle tercile	0.456**	(0.174)
upper tercile	1.104***	(0.248)
Constant	3.931***	(0.124)
No. of observations	1195	

Note: *, ** and *** indicate statistical significance at the 5%, 1% and 0.1% level, respectively.

Table F.5: Difference-in-differences regression with dynamic treatment effects and individual and time-fixed effects of overall absolute meat consumption in kilogram on treatment assignment, separately for male and female respondents with above and below median baseline meat consumption

	Below median						Above median					
	Female			Male			Female			Male		
	Coeff.	SE	95% CI	Coeff.	SE	95% CI	Coeff.	SE	95% CI	Coeff.	SE	95% CI
Follow-up 1	0.657***	(0.171)	[0.322,0.993]	0.525**	(0.202)	[0.127,0.923]	-0.601*	(0.283)	[-1.160,-0.042]	-1.331***	(0.257)	[-1.837,-0.826]
Follow-up 2	0.573***	(0.166)	[0.245,0.900]	0.977***	(0.245)	[0.496,1.458]	-1.263***	(0.332)	[-1.917,-0.609]	-1.645***	(0.256)	[-2.148,-1.143]
Follow-up 3	0.472**	(0.182)	[0.115,0.829]	0.856***	(0.219)	[0.425,1.286]	-1.242***	(0.309)	[-1.851,-0.632]	-1.185***	(0.298)	[-1.771,-0.600]
Follow-up 4	1.042***	(0.236)	[0.577,1.507]	0.924***	(0.214)	[0.502,1.346]	-1.134***	(0.313)	[-1.750,-0.517]	-1.608***	(0.269)	[-2.136,-1.079]
Info x FU1	-0.206	(0.257)	[-0.711,0.299]	0.239	(0.328)	[-0.406,0.884]	-0.446	(0.496)	[-1.424,0.532]	0.495	(0.356)	[-0.206,1.196]
Info x FU2	-0.174	(0.224)	[-0.615,0.266]	-0.427	(0.310)	[-1.037,0.184]	-0.089	(0.443)	[-0.964,0.785]	0.735*	(0.354)	[0.040,1.431]
Info x FU3	-0.181	(0.247)	[-0.666,0.305]	-0.312	(0.306)	[-0.915,0.291]	-0.498	(0.460)	[-1.404,0.409]	0.012	(0.410)	[-0.794,0.819]
Info x FU4	-0.664*	(0.301)	[-1.256,-0.072]	-0.327	(0.307)	[-0.932,0.277]	0.015	(0.491)	[-0.954,0.983]	0.839*	(0.395)	[0.063,1.615]
Support x FU1	-0.215	(0.230)	[-0.668,0.238]	-0.188	(0.311)	[-0.800,0.424]	-0.861	(0.464)	[-1.776,0.054]	0.773*	(0.352)	[0.081,1.465]
Support x FU2	-0.160	(0.243)	[-0.639,0.318]	-0.595*	(0.287)	[-1.159,-0.030]	0.260	(0.459)	[-0.645,1.166]	0.557	(0.370)	[-0.171,1.286]
Support x FU3	-0.279	(0.231)	[-0.733,0.175]	-0.728**	(0.279)	[-1.278,-0.178]	-0.204	(0.459)	[-1.109,0.701]	-0.286	(0.396)	[-1.064,0.492]
Support x FU4	-0.786**	(0.293)	[-1.363,-0.209]	-0.718*	(0.287)	[-1.283,-0.153]	-0.105	(0.474)	[-1.039,0.829]	0.922*	(0.375)	[0.185,1.659]
Combined x FU1	-0.493*	(0.230)	[-0.946,-0.040]	-0.092	(0.263)	[-0.610,0.427]	-0.517	(0.423)	[-1.352,0.318]	0.257	(0.356)	[-0.442,0.956]
Combined x FU2	-0.396	(0.234)	[-0.857,0.064]	-0.563	(0.306)	[-1.166,0.039]	0.058	(0.490)	[-0.909,1.024]	0.030	(0.375)	[-0.707,0.767]
Combined x FU3	-0.267	(0.223)	[-0.706,0.171]	-0.282	(0.294)	[-0.861,0.296]	-0.592	(0.464)	[-1.507,0.323]	-0.167	(0.412)	[-0.977,0.643]
Combined x FU4	-0.706*	(0.287)	[-1.270,-0.141]	-0.350	(0.282)	[-0.906,0.206]	-0.221	(0.491)	[-1.190,0.747]	0.439	(0.367)	[-0.282,1.160]
Constant	1.854***	(0.049)	[1.758,1.949]	2.239***	(0.059)	[2.124,2.355]	6.106***	(0.113)	[5.884,6.328]	6.624***	(0.082)	[6.463,6.785]
No. of observations	1643			1381			958			1884		

Note: Standard errors are clustered at the individual level and reported in parentheses; *, ** and *** indicate statistical significance at the 5%, 1% and 0.1% level, respectively. Wave coefficients report the time-fixed effects.

Figure F.1: Subgroup analysis: habit as barrier

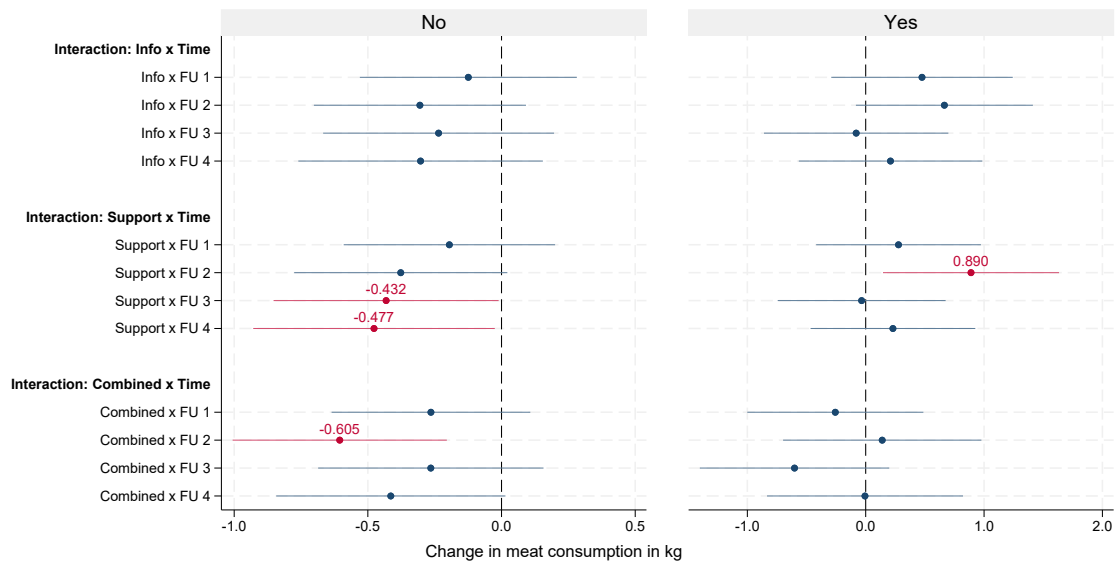


Figure F.2: Subgroup analysis: social desirability

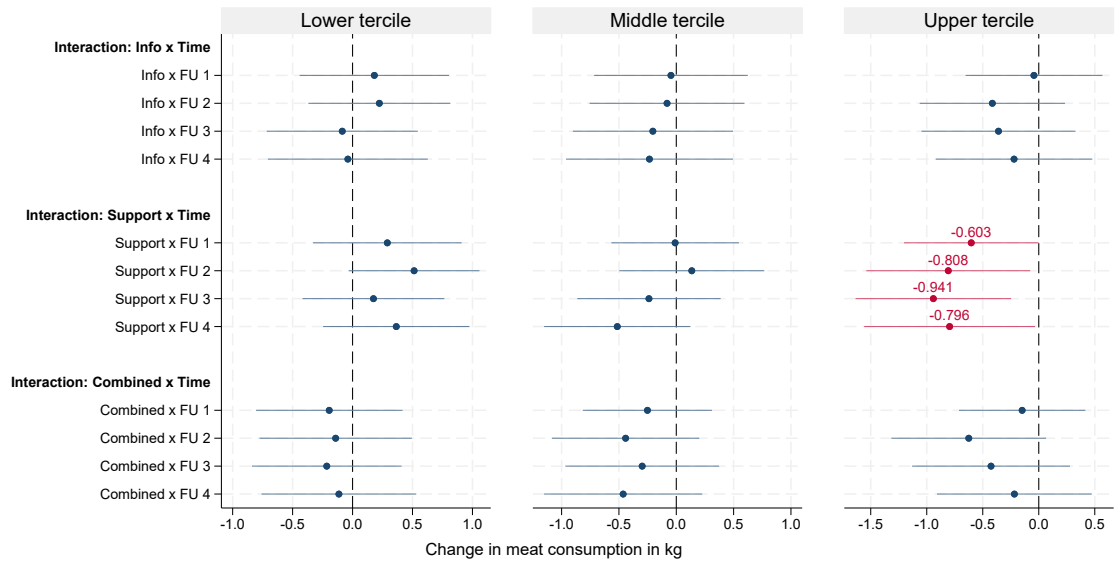
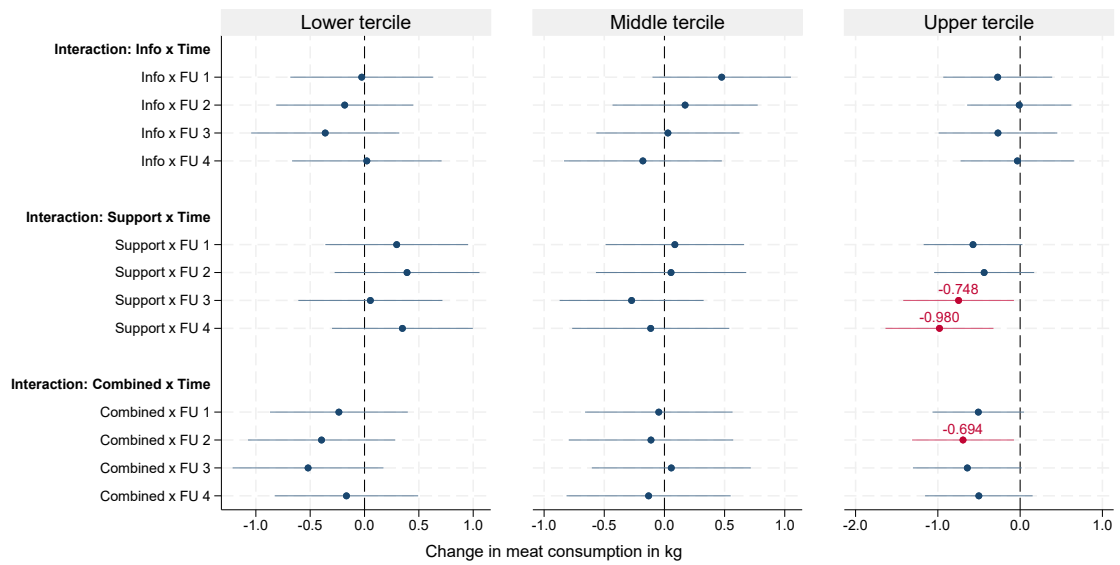


Figure F.3: Subgroup analysis: internal locus of control



G Robustness check for respondents participating in the baseline and at least one follow-up survey

Table G.1: OLS regression of endline meat consumption on treatment assignment and group membership

	Coeff.	SE	95% CI
Information	0.194	(0.172)	[-0.143,0.532]
Support	-0.067	(0.167)	[-0.394,0.259]
Combined	0.225	(0.165)	[-0.099,0.548]
Endline only	0.265*	(0.131)	[0.009,0.521]
Age	0.017***	(0.003)	[0.011,0.023]
Male	0.456***	(0.086)	[0.288,0.624]
At least technical college	-0.387***	(0.085)	[-0.554,-0.220]
Net household income			
1,200 - 2,700 Euro	0.141	(0.236)	[-0.323,0.605]
2,700 - 4,200 Euro	0.386	(0.235)	[-0.074,0.847]
> 4,200 Euro	0.311	(0.235)	[-0.150,0.772]
Intention	0.179***	(0.040)	[0.101,0.257]
Perceived behavioral control	-0.169**	(0.064)	[-0.294,-0.044]
Meat-eater identity	1.101***	(0.041)	[1.021,1.182]
Environmental attitude	-0.296***	(0.047)	[-0.388,-0.205]
Locus of control	-0.005	(0.043)	[-0.089,0.079]
Constant	0.889	(0.483)	[-0.057,1.835]
No. of observations		3007	

Note: *, ** and *** indicate statistical significance at the 5%, 1% and 0.1% level, respectively.

Table G.2: Difference-in-differences regression with dynamic treatment effects and individual and time-fixed effects of overall absolute meat consumption in kilogram on treatment assignment for individuals who participated in the baseline and at least one follow-up survey

	Coeff.	SE	95% CI
Follow-up 1	-0.146	(0.097)	[-0.335,0.044]
Follow-up 2	-0.241*	(0.106)	[-0.450,-0.032]
Follow-up 3	-0.300**	(0.110)	[-0.514,-0.085]
Follow-up 4	-0.133	(0.116)	[-0.360,0.094]
Info x FU1	0.029	(0.144)	[-0.254,0.312]
Info x FU2	0.027	(0.148)	[-0.264,0.317]
Info x FU3	-0.134	(0.160)	[-0.447,0.178]
Info x FU4	-0.131	(0.163)	[-0.450,0.188]
Support x FU1	-0.150	(0.136)	[-0.417,0.116]
Support x FU2	-0.066	(0.144)	[-0.348,0.215]
Support x FU3	-0.260	(0.150)	[-0.553,0.033]
Support x FU4	-0.237	(0.157)	[-0.545,0.071]
Combined x FU1	-0.133	(0.138)	[-0.404,0.138]
Combined x FU2	-0.175	(0.151)	[-0.471,0.122]
Combined x FU3	-0.099	(0.158)	[-0.409,0.210]
Combined x FU4	-0.046	(0.158)	[-0.357,0.264]
Constant	4.281***	(0.032)	[4.218,4.344]
No. of observations		9686	

Note: Standard errors are clustered at the individual level and reported in parentheses; *, ** and *** indicate statistical significance at the 5%, 1% and 0.1% level, respectively. Wave coefficients report the time-fixed effects.

Table G.3: Difference-in-differences regression with pooled follow-up periods and individual and time-fixed effects of overall absolute meat consumption in kilogram on treatment assignment for individuals who participated in the baseline and at least one follow-up survey

	Coeff.	SE	95% CI
FU period	-0.153	(0.090)	[-0.330,0.025]
Info x FU period	-0.045	(0.120)	[-0.281,0.190]
Support x FU period	-0.172	(0.113)	[-0.394,0.050]
Combined x FU period	-0.116	(0.118)	[-0.348,0.116]
Follow-up 1	0.026	(0.055)	[-0.082,0.135]
Follow-up 2	-0.058	(0.055)	[-0.165,0.049]
Follow-up 3	-0.188***	(0.057)	[-0.299,-0.077]
Constant	4.281***	(0.032)	[4.218,4.344]
No. of observations	9686		

Note: Standard errors are clustered at the individual level and reported in parentheses; *, ** and *** indicate statistical significance at the 5%, 1% and 0.1% level, respectively. The coefficient on Follow-up period represents the difference in the control group between the baseline and the follow-up periods in terms of the difference between the baseline and the fourth follow-up period. The wave coefficients report the monthly-fixed effects in terms of deviations from the coefficient on Follow-up period .

Table G.4: Pooled OLS regression of meat consumption on treatment assignment controlling for baseline consumption for individuals who participated in the baseline and at least one follow-up survey

	Coeff.	Model I SE	95% CI	Coeff.	Model II SE	95% CI	Coeff.	Model III SE	95% CI
Info	-0.029	(0.073)	[-0.171,0.114]	-0.064	(0.077)	[-0.214,0.086]	-0.082	(0.087)	[-0.252,0.088]
Support	-0.125	(0.068)	[-0.259,0.009]	-0.092	(0.073)	[-0.236,0.051]	-0.153	(0.084)	[-0.318,0.013]
Combined	-0.075	(0.070)	[-0.213,0.063]	-0.090	(0.073)	[-0.235,0.054]	-0.058	(0.085)	[-0.225,0.109]
Baseline meat consumption	0.696***	(0.011)	[0.674,0.718]	0.669***	(0.013)	[0.644,0.693]	0.587***	(0.017)	[0.553,0.622]
Gender									
female	-	-	-	-0.279***	(0.055)	[-0.388,-0.171]	-0.187**	(0.068)	[-0.320,-0.054]
non-binary	-	-	-	-0.315	(0.207)	[-0.722,0.091]	-0.160	(0.205)	[-0.561,0.242]
30-44	-	-	-	-0.147	(0.160)	[-0.460,0.167]	-0.264	(0.170)	[-0.598,0.070]
45-64	-	-	-	0.065	(0.156)	[-0.240,0.370]	-0.052	(0.167)	[-0.379,0.276]
≥ 65	-	-	-	-0.189	(0.155)	[-0.493,0.116]	-0.157	(0.169)	[-0.489,0.176]
College degree	-	-	-	-0.178**	(0.057)	[-0.290,-0.067]	-0.215***	(0.065)	[-0.342,-0.088]
Has children	-	-	-	0.059	(0.060)	[-0.058,0.176]	0.025	(0.067)	[-0.107,0.157]
Net income of hh									
1,200 – 2,700 Euro	-	-	-	-0.053	(0.127)	[-0.302,0.196]	-0.007	(0.165)	[-0.330,0.317]
2,700 – 4,200 Euro	-	-	-	-0.059	(0.128)	[-0.310,0.191]	-0.014	(0.163)	[-0.334,0.306]
> 4,200 Euro	-	-	-	-0.082	(0.130)	[-0.337,0.173]	-0.010	(0.167)	[-0.338,0.318]
Climate change attitudes									
anthropogenic	-	-	-	0.034	(0.208)	[-0.375,0.443]	0.099	(0.260)	[-0.410,0.609]
natural	-	-	-	-0.017	(0.143)	[-0.298,0.264]	0.078	(0.188)	[-0.291,0.447]
both	-	-	-	-0.078	(0.136)	[-0.346,0.189]	0.010	(0.177)	[-0.338,0.358]
Trust government	-	-	-	-0.004	(0.040)	[-0.083,0.075]	0.015	(0.048)	[-0.079,0.108]
Environ attitude	-	-	-	-0.153***	(0.037)	[-0.225,-0.081]	-0.085	(0.045)	[-0.173,0.003]
Social desirability	-	-	-	-0.048	(0.064)	[-0.173,0.078]	0.031	(0.076)	[-0.117,0.180]
Internal locus of control	-	-	-	0.022	(0.029)	[-0.034,0.078]	0.052	(0.035)	[-0.016,0.120]
Reduced meat consumption	-	-	-	-	-	-	-0.020	(0.085)	[-0.187,0.148]
Consumption below average	-	-	-	-	-	-	0.242***	(0.052)	[0.140,0.344]
Intention to reduce	-	-	-	-	-	-	0.058	(0.040)	[-0.020,0.136]
Attitudes toward reduction	-	-	-	-	-	-	-0.114*	(0.055)	[-0.222,-0.007]
Perceived behavioral control	-	-	-	-	-	-	0.045	(0.048)	[-0.049,0.139]
Meat-eater identity	-	-	-	-	-	-	0.176***	(0.045)	[0.088,0.263]
Injunctive norm	-	-	-	-	-	-	-0.008	(0.037)	[-0.080,0.064]
Descriptive norm	-	-	-	-	-	-	-0.001	(0.001)	[-0.003,0.002]
Contemplation	-	-	-	-	-	-	0.072	(0.174)	[-0.270,0.414]
Preparation	-	-	-	-	-	-	-0.325	(0.205)	[-0.726,0.077]
Satisfied with diet	-	-	-	-	-	-	-0.056	(0.047)	[-0.149,0.037]
Diet environmentally friendly	-	-	-	-	-	-	0.028	(0.049)	[-0.067,0.124]
Diet healthy	-	-	-	-	-	-	-0.008	(0.052)	[-0.110,0.094]
Share selfmade meals	-	-	-	-	-	-	-0.001	(0.002)	[-0.004,0.002]
Number of barriers	-	-	-	-	-	-	-0.001	(0.006)	[-0.013,0.011]
Habit as barrier	-	-	-	-	-	-	0.183*	(0.083)	[0.021,0.346]
Carbon knowledge	-	-	-	-	-	-	-0.055	(0.029)	[-0.111,0.002]
Constant	1.110***	(0.063)	[0.987,1.233]	2.285***	(0.369)	[1.562,3.008]	1.214*	(0.562)	[0.111,2.317]
No. of observations	8832			7510			5105		

Note: Standard errors are clustered at the individual level; *, ** and *** indicate statistical significance at the 5%, 1% and 0.1% level, respectively.

H Newsletters

Figure H.1: Example of Information Newsletter

Did you know ...

Wussten Sie, ...

... dass Sie Ihre ernährungsbedingten **CO₂-Emissionen** bereits um **27 % senken** können, wenn Sie beispielsweise Ihren **Fleischkonsum** halbieren und anstelle von vier nur zwei Bratwürste pro Woche essen?

... you can **reduce** your diet-related **CO₂ emissions** by already **27%** if, for example, you halve your **meat consumption** and eat two bratwürsts per week instead of four.

5.785 kg CO₂

... dass Sie **20 Portionen Gemüse** essen können und dabei **weniger CO₂-Emissionen** verursachen als wenn Sie **eine Portion Rind- oder Lammfleisch** essen?

... that eating **20 servings of vegetables** causes less **CO₂ emissions** than one serving of beef or lamb?

... dass Sie die **CO₂-Emissionen**, die durch Ihre Ernährung entstehen, durchschnittlich von 1,75 Tonnen auf 1,3 Tonnen pro Jahr **senken** können, wenn Sie sich für eine **vegetarische Ernährungsweise** entscheiden?

... that you can **decrease** the **CO₂ emissions** generated through your diet from an average of 1.75 tons to 1.3 tons by choosing a **vegetarian diet**?

<https://www.mdr.de/wissen/fleischkonsum-reduktion-klima-wwf-100.html>
 Tilman, David, and Michael Clark (2014): „Global diets link environmental sustainability and human health.“ Nature 515:528-532.
https://sustainability.ucsf.edu/upload/livinggreen/files/Tilman_2014_Nature_Global_diets_link_environmental_sustainability_and_human_health.pdf
https://www.focus.de/perspektiven/entwicklung-foerdern-klima-schuetzen/nachhaltiger-leben-muessen-wir-aufhoeren-fleisch-zu-essen-wie-vegetarier-die-welt-retten_id_10897642.html#:~:text=Wer%20sich%20komplett%20vegetarisch%20ern%C3%A4hrt,nur%20die%20H%C3%A4lfte%20des%20Fleischbedarfs

Figure H.2: Example of Support Newsletter

Tips for a more environmentally and climate friendly diet




Tips of the Week:

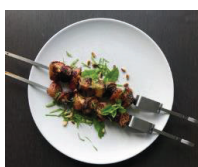
- At breakfast it is especially easy to eat in a more environmentally and climate friendly way (e.g. by skipping meat. Have you ever tried a vegetarian spread? By now there is a wide selection of different spreads in supermarkets. Come and try something new once in a while!
- Avocado, too, is a great fit for a breakfast sandwich. [Here](#) you can find a recipe for avocado bruschetta.



Patatas bravas

 Duration: 30 min | Difficulty: easy

Ingredients for 4 servings: 1 kg Waxy Potatoes | 1 Onion | 1 Clove of Garlic | 1 Red Bell Pepper | 1 Hot Pepper | 1 Tbsp Tomato Paste | 400 g Can of Diced Tomatoes | 1 Tsp Mild Red Paprika



Skewers with Peach, Mint and Pine Nuts


 Duration: 10 min (Total Time: 20 min) | Difficulty: easy

Ingredients for 4 servings: 3 Peaches | 1 Tsp ground coffee | 1 Tsp Sumac | 1 Tsp Anis | 60 g Pine Nuts | 2 Tbsp Mint Leaves

Tip: You can also season 600 g of tofu or seitan cubes with 2 Cloves of Garlic, 2 Tsp chili flakes, 1 Tsp curcuma, ½ Tsp cumin and 1 Tsp fennel and skewer them with the peach pieces. [Here](#) you can find a basic recipe for seitan skewers.

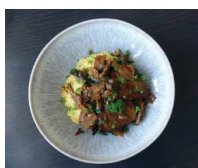


Feta Cheese Packets (perfect for barbecuing)

 Duration: 10 min (Total Time: 30 min) | Difficulty: easy

Ingredients for 4 servings: 1 Onion | 1 Red Bell Pepper | 2 Vine-Ripened Tomatoes | 80 g Green Olives | 400 g Feta | 1 Tsp dried Oregano

Tip: Feta Cheese Packets pair perfectly with baguette or green salad. | Instead of wrapping the feta cheese and vegetables in aluminium foil you can also use a baking dish or a reusable grilling tray.



Herb Polenta with Braised Tofu in Vegetable-Red-Wine Sauce

 Duration: 60 min | Difficulty: advanced

Ingredients for 4 servings: 450 g Firm Tofu | 3 Tbsp Soy Sauce | 1 Tbsp Tomato Ketchup | 4 Tbsp Olive Oil | 3 Carrots | 1 Zucchini | 1 Medium Root Parsley | 150 g Brown Button Mushrooms | 1 Onion | 1 Clove of Garlic | 125 ml Red Wine | 375 ml Vegetable Broth | 1 Tsp Mild Red Paprika | 1 Tsp Tomato Paste | ½ Tsp Dried Thyme | 1 ½ Tsp Vegetable Broth Powder | 1 Tsp Herb Salt | 20 g Margarine | 2 Tbsp Yeast Flakes | 2 Tbsp Fresh Basil | 2 Tbsp Fresh Parsley | 2 Tbsp Fresh Chives | 250 g Polenta

Tip: If you don't like tofu, you can just use more vegetables. However, you shouldn't skip the ingredients for the marinade (soy sauce and tomato ketchup). Instead of herb polenta you can also serve herb potato puree with the braised tofu. Simply boil potatoes, mash them, and mix them with the herbs and spices for the polenta along with some margarine.



Colourful Buddha Bowl with Curcuma-Sweet-Potatoes and a poached Egg

 Duration: 30 min | Difficulty: easy

Ingredients for 4 servings: 2 Big Sweet Potatoes | 2 Tsp Curcuma | 2 Cloves of Garlic | 480 ml Vegetable Broth | 1 Tbsp Olive Oil | 4 Eggs | 120 g Brown Rice | 4 Handful of Baby Spinach | 50 g Pistachios | 60 ml Lemon Juice | 1 Tbsp Maple Sirup | 4 Twigs of Parsley

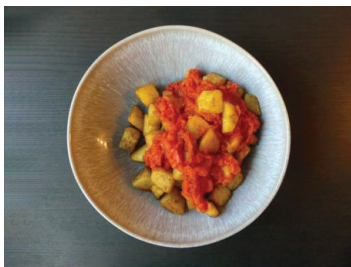
RECIPES



Patatas bravas

●○○ Duration: 30 min | Difficulty: easy

Ingredients for 4 servings: 1 kg Waxy Potatoes | 1 Onion | 1 Clove of Garlic | 1 Red Bell Pepper | 1 Hot Pepper | 1 Tbsp Tomato Paste | 400 g Can of Diced Tomatoes | 1 Tsp Mild Red Paprika



1. Peel, wash and cut potatoes into 2 cm cubes. Boil in saltwater for 15 minutes until soft.
2. In the meantime, halve, peel and roughly chop the onion. Peel and chop the garlic. Wash and halve the bell pepper and hot pepper, remove the stem and core, and cut into cubes.
Tip: If you don't own an immersion blender you can cut the bell pepper and hot pepper into smaller chunks and skip the pureeing in step 5.
3. In a pot heat 2 Tbsp of Oil on medium heat and sauté bell pepper, onions and garlic for 3 minutes. Add Tomato Paste and fry another 2 minutes. Add diced tomatoes and cook for 20 minutes.
4. Strain potatoes. Heat 8 Tbsp of oil in a pan on medium-high heat and fry the potato cubes for 10 minutes until crispy.
5. Finely puree the tomato sauce and season to taste with salt, pepper and sugar.
6. Take the potatoes out of the pan, let them drain on a piece of kitchen towel, and season them with paprika powder and salt. Arrange pastas bravas on a plate and serve with the tomato sauce.



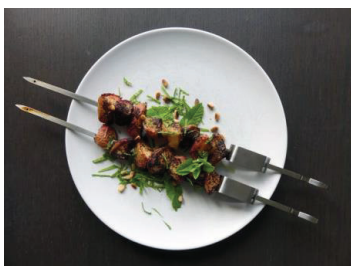
Skewers with Peach, Mint and Pine Nuts

●○○ Duration: 10 min (Total Time: 20 min) | Difficulty: easy

Ingredients for 4 servings: 3 Peaches | 1 Tsp ground coffee | 1 Tsp Sumac | 1 Tsp Anis | 60 g Pine Nuts | 2 Tbsp Mint Leaves

Tip: You can also season 600 g of tofu or seitan cubes with 2 Cloves of Garlic, 2 Tsp chili flakes, 1 Tsp curcuma, ½ Tsp cumin and 1 Tsp fennel and skewer them with the peach pieces.

[Here](#) you can find a basic recipe for seitan skewers.



1. Remove the pits from the peaches, quarter them, and fry them on a grill over indirect heat or in a pan on medium heat.
2. Season the peach pieces with salt and sugar. Next, in a bowl mix them with sumac, anis, coffee and olive oil.
3. Skewer the peach pieces and fry on a grill over direct heat or in a pan on high heat for 4 minutes until lightly browned from all sides.
4. Serve the skewers with some mint leaves and pine nuts.



Feta Cheese Packets (perfect for barbecuing)

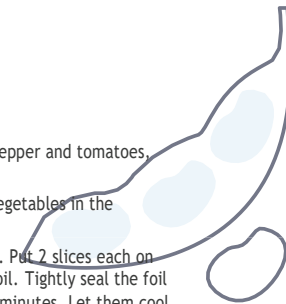
●○○ Duration: 10 min (Total Time: 30 min) | Difficulty: easy

Ingredients for 4 servings: 1 Onion | 1 Red Bell Pepper | 2 Vine-Ripened Tomatoes | 80 g Green Olives | 400 g Feta | 1 Tsp dried Oregano

Tip: Feta Cheese Packets pair perfectly with baguette or green salad. | Instead of wrapping the feta cheese and vegetables in aluminium foil you can also use a baking dish or a reusable grilling tray.



1. Preheat the oven to 220 °C (convection). Peel the onions, wash the bell pepper and tomatoes, remove the stem and seeds of the bell pepper, and slice into thin rings.
2. Fold 4 big sheets of aluminum foil into squares with two layers. Put the vegetables in the center and add salt, pepper, 1/2 Tsp oregano, and 3 Tbsp of olive oil.
3. Drain the feta. Halve every piece and then cut it horizontally into 2 slices. Put 2 slices each on every vegetable packet, season with the remaining oregano and cover in oil. Tightly seal the foil and cook the packets in an oven for 25-30 minutes or on a hot grill for 20 minutes. Let them cool before eating, unwrap carefully and serve.

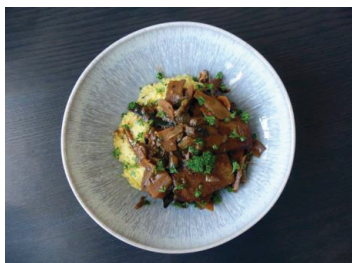


Herb Polenta with Braised Tofu in Vegetable-Red-Wine Sauce

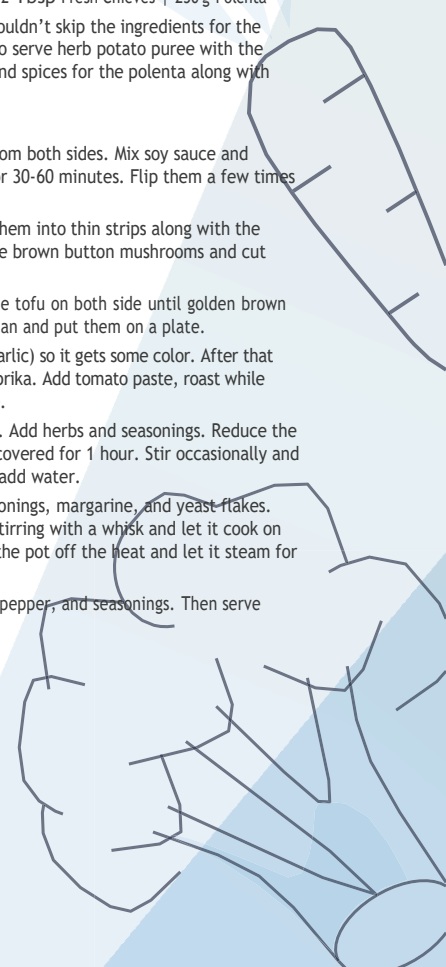
Duration: 60 min | Difficulty: advanced

Ingredients for 4 servings: 450 g Firm Tofu | 3 Tbsp Soy Sauce | 1 Tbsp Tomato Ketchup | 4 Tbsp Olive Oil | 3 Carrots | 1 Zucchini | 1 Medium Root Parsley | 150 g Brown Button Mushrooms | 1 Onion | 1 Clove of Garlic | 125 ml Red Wine | 375 ml Vegetable Broth | 1 Tsp Mild Red Paprika | 1 Tsp Tomato Paste | 1/2 Tsp Dried Thyme | 1 1/2 Tsp Vegetable Broth Powder | 1 Tsp Herb Salt | 20 g Margarine | 2 Tbsp Yeast Flakes | 2 Tbsp Fresh Basil | 2 Tbsp Fresh Parsley | 2 Tbsp Fresh Chives | 250 g Polenta

Tip: If you don't like tofu, you can just use more vegetables. However, you shouldn't skip the ingredients for the marinade (soy sauce and tomato ketchup). Instead of herb polenta you can also serve herb potato puree with the braised tofu. Simply boil potatoes, mash them, and mix them with the herbs and spices for the polenta along with some margarine.



1. Cut the tofu into 1 cm thick slices and pat them dry from both sides. Mix soy sauce and tomato ketchup in a bowl and let the tofu marinate for 30-60 minutes. Flip them a few times to evenly coat them in the marinade.
2. Meanwhile, peel the carrots and root parsley and cut them into thin strips along with the zucchini. Peel the onion and cut it into slices. Wash the brown button mushrooms and cut them into thin slices. Peel and crush the garlic.
3. Heat the olive oil in a large pan on high heat and fry the tofu on both sides until golden brown (keep the marinade!). Take the fried pieces out of the pan and put them on a plate.
4. Reduce the heat and roast the vegetables (except the garlic) so it gets some color. After that add the garlic and dust the vegetables with mild red paprika. Add tomato paste, roast while stirring for a few seconds and the deglaze with red wine.
5. Mix everything with the marinade and vegetable broth. Add herbs and seasonings. Reduce the heat to simmering, add the tofu slices and let it stew covered for 1 hour. Stir occasionally and check the temperature. If too much liquid evaporates add water.
6. For the polenta bring the water to a boil with the seasonings, margarine, and yeast flakes. Add the finely chopped herbs. Add the polenta while stirring with a whisk and let it cook on low heat. Let it simmer for a few minutes. Then take the pot off the heat and let it steam for 10 minutes.
7. Season the vegetable-red-wine sauce to taste with salt, pepper, and seasonings. Then serve with the herb polenta.





Colorful Buddha Bowl with Curcuma-Sweet-Potatoes and a poached Egg

Duration: 30 min | Difficulty: easy

Ingredients for 4 servings: 2 Big Sweet Potatoes | 2 Tsp Curcuma | 2 Cloves of Garlic | 480 ml Vegetable Broth | 1 Tbsp Olive Oil | 4 Eggs | 120 g Brown Rice | 4 Handful of Baby Spinach | 50 g Pistachios | 60 ml Lemon Juice | 1 Tbsp Maple Sirup | 4 Twigs of Parsley



1. Wash, peel and cube the sweet potato. In a pot sauté the sweet potato on medium heat in some olive oil. Chop the garlic and add it to the pot with curcuma.
2. Add the vegetable broth and let the sweet potatoes steam until they are soft and have almost taken up all of the broth. If too much liquid evaporates add water. Next puree the contents of the pot or mash them with a fork or potato masher.
3. In the meantime, rinse the rice and bring it to a boil with three times the amount in water. Once it is boiling reduce the heat and let it simmer for 20 minutes.
4. For the poached eggs bring water to a boil in a flat pot and add 3 Tbsp of vinegar. Procedure for every egg: crack the egg into a cup. Reduce the heat when the water is boiling. Stir the water with a wooden spoon to create a swirl. Carefully place the egg into the water. Through the swirl the egg yolk gets encased in the setting egg white. Let the egg cook for 5 minutes before removing it.
5. For the dressing finely chop the parsley. Mix the parsley, lemon juice, maple sirup, 80 ml of olive oil and a pinch of salt.
6. Arrange rice, spinach, sweet potato puree and the eggs in four bowls. Serve with a drizzling of pistachios and dressing.

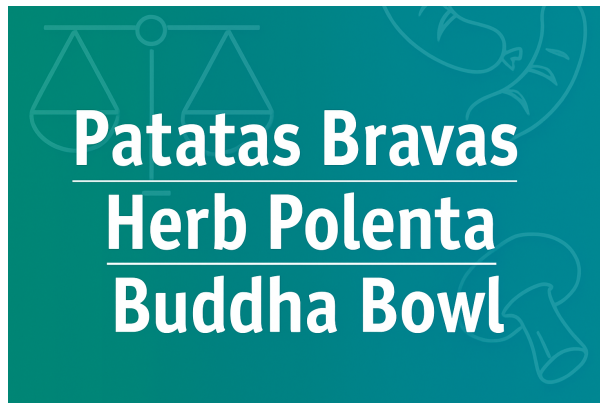
Recipe variation: Fundamentally, a bowl consists of a base of salad (20% e.g. spinach, coriander, kale, arugula, watercress), carbohydrates (20% e.g. couscous, rice, quinoa, corn, millet, rice noodles, glass noodles, sweet potatoes), vegetables (20% e.g. carrots, tomatoes, bell pepper, cucumber, zucchini, broccoli, cauliflower, red beets, mushrooms), protein (20% e.g. chickpeas, tofu, hempseeds, lentils, eggs, beans), healthy fats (10% e.g. avocado, chia seeds, sesame seeds, cashews, walnuts, peanuts), fruit (5% e.g. mangoes, apples, strawberries, grapes, pears, goji berries) and toppings (5% e.g. hummus, feta, sprouts, herbs, coconut flakes, sunflower seeds, lime juice). Of course you can't forget about the dressing: For example, peanut, sesame, or coconut oil, yogurt with seasonings like salt, pepper, chili, garlic, ginger, cinnamon, curry, piri piri salt, or tahini (sesame paste) or nut butter. Dressings with lime juice or vinegar also fit well with a bowl.

Click [here](#) to get inspired.

Figure H.3: Preview of newsletters included in the e-mail



(a) Information newsletter 1



(b) Support newsletter 1

Long-Run Effects of a Behavioral Intervention: Experimental Evidence on Meat Consumption

Jana Eßer, Daniela Flörchinger, Manuel Frondel,
and Stephan Sommer

Supplementary Material

Long-Run Effects of a Behavioral Intervention: Experimental Evidence on Meat Consumption

Jana Eßer^{*†} Daniela Flörchinger^{*†} Manuel Frondel^{*†} Stephan Sommer[‡]

Supplementary Materials

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†Ruhr University Bochum

‡Bochum University of Applied Sciences

1 Weights for meat categories

1.1 Weights assigned to meat categories

To assign average weights of one portion to each category, we commissioned a student assistant to conduct an online research. Based on the examples for each meat category provided in the FFQ, she searched for corresponding weights in blog entries, recipes and supermarket offers. For each example dish or product she then calculated the average weight for one portion and finally used these average to calculate the average weight for each category. The Supplementary Materials SM_weights.xlsx provide an overview of the sources used and the weights assigned.

As an alternative to the manual online research for weights, we provided ChatGPT with the FFQ and the example pictures and asked for its suggested average weights. English translation of prompt:

In an online survey, we asked participants to indicate their meat consumption in portions for different categories. We used the following table for this [table inserted from Word questionnaire]. In addition, we provided the participants with pictures to estimate the size of a portion (see attached file). Now we want to convert the quantities given into kilograms. What conversion factor (kg/serving) would you suggest for each of the categories?

The weights proposed by ChatGPT are reported in the Supplementary Materials SM_weights.xlsx.

1.2 Regression results for alternative weights

Table 1: Difference-in-differences regression with pooled follow-up periods and individual and time-fixed effects of overall absolute meat consumption in kilogram on treatment assignment using weights proposed by ChatGPT

	Coeff.	SE	95% CI
FU period	-0.097	(0.097)	[-0.286,0.092]
Info x FU period	-0.056	(0.125)	[-0.301,0.188]
Support x FU period	-0.153	(0.122)	[-0.392,0.085]
Combined x FU period	-0.217	(0.125)	[-0.461,0.028]
Follow-up 1	0.035	(0.052)	[-0.067,0.137]
Follow-up 2	-0.066	(0.051)	[-0.167,0.034]
Follow-up 3	-0.193***	(0.052)	[-0.295,-0.090]
Constant	3.394***	(0.035)	[3.326,3.462]
No. of observations	6436		

Note: Standard errors are clustered at the individual level and reported in parentheses; *, ** and *** indicate statistical significance at the 5%, 1% and 0.1% level, respectively. The coefficient on Follow-up period represents the difference in the control group between the baseline and the follow-up periods in terms of the difference between the baseline and the fourth follow-up period. The wave coefficients report the monthly-fixed effects in terms of deviations from the coefficient on Follow-up period .

Table 2: Difference-in-differences regression with dynamic treatment effects and individual and time-fixed effects of overall absolute meat consumption in kilogram on treatment assignment using weights proposed by ChatGPT

	Coeff.	SE	95% CI
Follow-up 1	-0.105	(0.101)	[-0.304,0.094]
Follow-up 2	-0.178	(0.113)	[-0.399,0.043]
Follow-up 3	-0.234*	(0.112)	[-0.454,-0.014]
Follow-up 4	-0.095	(0.120)	[-0.331,0.141]
Info x FU1	0.021	(0.151)	[-0.275,0.316]
Info x FU2	-0.003	(0.149)	[-0.296,0.289]
Info x FU3	-0.157	(0.157)	[-0.464,0.151]
Info x FU4	-0.091	(0.163)	[-0.411,0.229]
Support x FU1	-0.087	(0.142)	[-0.366,0.193]
Support x FU2	-0.070	(0.149)	[-0.363,0.223]
Support x FU3	-0.269	(0.151)	[-0.564,0.026]
Support x FU4	-0.190	(0.158)	[-0.500,0.120]
Combined x FU1	-0.189	(0.142)	[-0.468,0.089]
Combined x FU2	-0.303*	(0.154)	[-0.605,-0.001]
Combined x FU3	-0.219	(0.156)	[-0.525,0.088]
Combined x FU4	-0.156	(0.160)	[-0.469,0.157]
Constant	3.394***	(0.035)	[3.326,3.462]
No. of observations	6436		

Note: Standard errors are clustered at the individual level and reported in parentheses; *, ** and *** indicate statistical significance at the 5%, 1% and 0.1% level, respectively. Wave coefficients report the time-fixed effects.

2 Power simulation from pre-analysis plan

To ensure that we have enough power to test the effectiveness of two single interventions and the combination of these, we conducted a power simulation using the program command in Stata 16.1.

Based on the per capita meat consumption in Germany 2021 of 55 kg per year (Bundesanstalt für Landwirtschaft und Ernährung, 2024) and assuming a normal distribution, we simulate various longitudinal data sets with two periods, pre and post treatment, and two experimental groups, a control group and a treatment group. In these data sets we vary the sample size, the effect size, as well as the standard deviation of meat consumption which varies between around 45 percent and 70 percent of the mean in the received literature.

We then regress monthly meat consumption on a treatment dummy using two different estimation methods: a simple OLS regression in which we control for baseline meat consumption and a difference-in-differences (DiD) regression. Using the simulate command we repeat these regressions 1,000 times for each combination of sample size, effect size, and standard deviation, and save the t-values of the estimated treatment effects. For each effect size we then identify the sample size required to identify the respective effect in a comparison of two groups with a power of 80 percent and a significance level of 5 percent, which corresponds to the sample sizes for which the absolute t-value of the estimated effect is equal to or larger than 2.8.

The following tables show the sample sizes required for pairwise comparisons of three and four experimental groups (i.e., one control group and two or three treatment groups) using an OLS regression with lagged dependent variable and a DiD regression, assuming a standard deviation of meat consumption of roughly 45 and 70 percent of the mean, respectively. We assume that roughly 2,000 participants will take part in our follow-up surveys. Therefore, the results of our power simulation indicate that we are able to identify an effect of $\delta = 6\%$ to $\delta = 7\%$ in case of three experimental groups, and an effect of $\delta = 7\%$ to $\delta = 8\%$ in case of four experimental groups if we assume a relatively low standard deviation of 45% and use the more efficient method of an OLS regression with lagged dependent variable. In a more pessimistic scenario with a higher standard deviation of 70% and using a DiD regression, the minimum detectable effect is $\delta = 9\%$ to $\delta = 10\%$ in case of three groups and $\delta = 10\%$ to $\delta = 12\%$ in case of four groups. Due to the small difference in the minimum detectable effect between three

and four experimental groups, we decide to use four groups, i.e., three treatment groups and one control group.

Table 3: Required sample size for OLS with LDV

	3 groups		4 groups	
	<i>sd</i> = 45%	<i>sd</i> = 70%	<i>sd</i> = 45%	<i>sd</i> = 70%
$\delta = 0,01$	>3000	>3000	>4000	>4000
$\delta = 0,05$	>3000	>3000	>4000	>4000
$\delta = 0,06$	2250	>3000	3000	>4000
$\delta = 0,07$	1650	2250	2200	3000
$\delta = 0,08$	1350	1800	1800	2400
$\delta = 0,09$	1050	1500	1400	2000
$\delta = 0,10$	900	1200	1200	1600
$\delta = 0,11$	750	1050	1000	1400
$\delta = 0,12$	600	900	800	1200
$\delta = 0,13$	<600	750	<800	1000
$\delta = 0,14$	<600	600	<800	800
$\delta = 0,15$	<600	<600	<800	<800

Table 4: Required sample size for DiD

	3 groups		4 groups	
	<i>sd</i> = 45%	<i>sd</i> = 70%	<i>sd</i> = 45%	<i>sd</i> = 70%
$\delta = 0,01$	>3000	>3000	>4000	>4000
$\delta = 0,05$	>3000	>3000	>4000	>4000
$\delta = 0,06$	3000	>3000	4000	>4000
$\delta = 0,07$	2250	>3000	3000	>4000
$\delta = 0,08$	1650	2850	2200	3800
$\delta = 0,09$	1350	2250	1800	3000
$\delta = 0,10$	1200	1800	1600	2400
$\delta = 0,11$	900	1500	1200	2000
$\delta = 0,12$	750	1200	1000	1600
$\delta = 0,13$	750	1050	1000	1400
$\delta = 0,14$	<600	900	<800	1200
$\delta = 0,15$	<600	900	<800	1200

3 Questionnaire

3.1 Baseline survey

In the following we report all survey questions that are relevant for our analyses. The original questionnaire is in German. In addition to the survey data, we received information on age, gender, income and education.

In the following part of the survey we are interested in your diet.

F0a: (Diet - meat consumption): Which diet generally applies to you?

I eat ...

- everything, both plant and animal products
- rarely meat/flexitarian
- vegetarian (neither meat nor fish or products made from them, such as sausage, but products from living animals such as eggs or milk)
- pescetarian (no meat products, but fish)
- vegan (no animal products)
- other, namely _____
- No answer

F0b: (Diet - other restrictions): Did you eat differently than you normally do in the past four weeks?

- No
- Yes, namely _____
- No answer

F1_freq:

If F0a = "everything, both plant and animal products"

You have indicated that you eat both plant and animal products.

If F0a = "rarely meat/flexitarian"

You have indicated that you rarely eat meat or have a flexitarian diet.

For both groups ("everything" and "rarely meat/flexitarian"):

How many meals have you eaten meat at in the last week? Please think about your breakfast, lunch and dinner as well as snacks.

_____ Meals

F1: (Query meat consumption) As part of our research project, we are interested in your **meat and fish consumption** and would like to ask you to indicate on the following page how much meat and fish you have eaten **in the last four weeks**. For our study, it does not matter whether you have eaten a lot or little meat and fish. The only important thing is that you answer

honestly and as accurately as possible.

To make it easier for you to indicate your meat and fish consumption, we have divided various meat and fish products and dishes containing meat, sausage or fish into 9 categories:

Category 1: Sliced sausage, spreadable sausage, ham (cubes) and the like

Category 2: Bratwurst, boiled sausage and the like

Category 3: Schnitzel, steak and the like

Category 4: Poultry

Category 5: Kebab, gyros, burgers and the like with meat or sausage

Category 6: Pizza, pide, quiche and the like with meat or sausage

Category 7: Mixed dishes such as salads, soups or rice dishes with meat or sausage

Category 8: Quick meals/snacks with meat or sausage

Category 9: Fish and seafood

In the table below, you can now enter how many portions of meat or fish you have eaten from each category **in the last four weeks**. Please remember that it does not matter for our study whether you have eaten a lot or little meat and fish. The only important thing is that you answer honestly and as accurately as possible.

Please note:

- If you would like to indicate **less than one portion**, you can do so by indicating 0.5 for a half portion or 0.25 for a quarter portion, for example.
- Please **do not assign meals twice**.

You can find further information on indicating your meat and fish consumption [here](#).


Information window:

- For each of the categories, you can indicate below how many portions you have eaten in the last four weeks. For each category, you can choose to indicate your consumption **per day, per week or per month**, whichever is easiest for you.
- If you have eaten something that **does not fit directly into one of the categories listed**, please assign it to the category in which the amount of meat in a portion is most similar to the amount of meat in your meal.

Figure 1: Example from the online survey for Category 1

Kategorie 1: Aufschnittwurst, Streichwurst, Schinken(würfel) und Ähnliches ¹

Aufschnittwurst, Schinken(würfel), Streichwurst, Wurstsalat oder Ähnliches - z.B. zum Frühstück oder Abendbrot, auf einem Brot, Brötchen oder im Rührei. ²


Hinweis: Eine Portion entspricht etwa einer Scheibe Mortadella. **Beispielfoto** ³ 

Portionen pro ⁵

habe ich nicht gegessen ⁶

weiß nicht / keine Angabe ⁷

Kategorie 1: Aufschnittwurst, Streichwurst, Schinken(würfel) und Ähnliches
Beispielbilder für eine Portion ⁴



Translation

¹ Category 1: Sliced sausages, spreadable sausage, ham (cubes) and the like

² Sliced sausages, spreadable sausage, ham (cubes) and the like, e.g., for breakfast or dinner, on bread or in scrambled eggs

³ Note: One portion is about a slice of mortadella. **Example photo** ⁱ [Example photo opens when clicking on button]

⁴ Category 1: Sliced sausages, spreadable sausage, ham (cubes) and the like – Example photos of one portion

⁵ _____ portions per [day, week, month] v

⁶ did not eat this

⁷ don't know / know answer

This was repeated in the same manner for the following categories:

Category 2: Bratwurst, boiled sausage and the like

Bratwurst, curry wurst, white wurst, viennese wurst, bockwurst or the like, e.g. at a barbecue, with fries, bread or pretzel, or in a hotdog

Note: One portion is about one mid-sized bratwurst

Category 3: Schnitzel, steak and the like

Schnitzel, steak, cutlet, grilled meat (also skewers, pork ribs, etc.), roast, meat loaf or the like

Note: One portion is about one cutlet, one steak or one schnitzel

Category 4: Poultry

Poultry, e.g. in the form of chicken breast fillet, duck breast, chicken thighs, nuggets, wings or the like

Note: One portion is about one chicken thigh, one chicken breast fillet or eight nuggets or wings

Category 5: Kebab, gyros, burgers and the like with meat or sausage

Kebab meat, gyros, pulled pork, minced meat/meatball/burger patty or the like, e.g. in a flat-bread/roll/wrap/taco/burger or on a mixed plate with side dishes (kebab plate, gyro plate, etc.)

Note: One portion is about the same as one kebab or one kebab plate. If you have eaten a portion with double meat, this counts as two portions

Category 6: Pizza, pide, quiche and the like with meat or sausage

Pizza, pide, tarte flambée, quiche or similar with salami, ham (diced), kebab meat, minced meat, etc.

Note: One portion is about the same as a normal-sized salami pizza. A pizza with a lot of meat, e.g. a pizza with kebab meat, corresponds to about 2 portions

Category 7: Mixed dishes such as salads, soups or rice dishes with meat or sausage

Mixed dishes such as salads, bowls, soups, casseroles, stews, rice or pasta dishes containing meat, e.g. bolognese, chili con carne, curry, stew with sausage, chicken soup, pho, Zürcher Geschnetzeltes, goulash, etc.

Note: One portion corresponds to one plate or one large soup bowl

Category 8: Quick meals/snacks with meat or sausage

Meat as a quick snack (if not already mentioned in another category) - e.g. salami sticks, Landjäger sausages, sandwiches, cheese bread rolls with ham cubes, meat loaf rolls

Note: One portion corresponds to about one meat loaf roll. A bread roll topped with several slices of sausage/ham corresponds to about half a portion. A salami stick or a cheese bread roll with ham cubes corresponds to about a quarter portion

Category 9: Fish and seafood

Fish and seafood, e.g. salmon fillet, matjes, tuna, smoked salmon, prawns, clams etc.

Note: One portion corresponds to about one piece of fish fillet. A can of tuna corresponds to about half a portion, a slice of smoked salmon to a quarter of a portion

F2a_1: How many meals do you eat in total in a typical working week (Monday to Friday)?

Note: Please do not include breakfast and snacks.

_____ Meals per week (without weekend)

- Don't know / no answer

F2a_2: How many meals do you eat in total on a typical weekend (Saturday and Sunday)?

Note: Please do not include breakfast and snacks.

_____ Meals per weekend

- Don't know / no answer

F2b_1: How many of the meals you eat on average in a working week (Monday to Friday) are

...

Note: Please divide the answer of *F2a_1* into the types of dishes below. If you do not know exactly, please estimate.

- home-cooked meals (prepared by yourself or another person from your household)
- ready meals, such as frozen meals or canned food
- meals that you eat in a restaurant, canteen, snack bar, etc. or take away from there or have delivered to you
- other

F2b_2: How many of the meals you eat on average on the weekend (Saturday and Sunday) are

...

Note: Please divide the answer of *F2a_2* into the types of dishes below. If you do not know exactly, please estimate.

- home-cooked meals (prepared by yourself or another person from your household)
- ready meals, such as frozen meals or canned food
- meals that you eat in a restaurant, canteen, snack bar, etc. or take away from there or have delivered to you
- other

In the following, we are more interested in your meat consumption and your attitudes towards it. For the sake of simplicity, we will only refer to meat, but we also include meat products such as sausage.

F3: Do you think you eat more or less meat than the average German?

- Much less
- A bit less
- About as much as the average
- A bit more
- Much more
- Don't know / no answer

F4: Have you reduced your meat consumption in the last few years?

- Yes
- No
- Don't know / no answer

If F4 = "No"

F5a: state of change (Wolstenholme et al. 2021)

Which of the following statements best describes how you feel about your current meat consumption?

- (1) I am happy with my meat consumption and see no need to change it.
- (2) I would like to increase my meat consumption.
- (3) I would like to reduce my meat consumption, but it's difficult for me at the moment.
- (4) I would like to reduce my meat consumption and plan to do so in the near future.
- (5) Don't know / no answer

If F4 = "Yes"

F5b: state of change (Wolstenholme et al. 2021)

Which of the following statements best describes how you feel about your current meat consumption?

- (1) I have already reduced my meat consumption, but I do not think it is possible to maintain this lower consumption.
- (2) I have already reduced my meat consumption and am satisfied with my current consumption.
- (3) I have already reduced my meat consumption, but plan to reduce it even further.
- (4) Don't know / no answer

F6: attitude (Wolstenholme et al. 2021)

Reducing your meat consumption is ...

Show items in matrix and in random order.

- (1) bad ... (5) good
- (1) not important ... (5) important
- (1) not environmentally friendly ... (5) environmentally friendly
(additionally) Don't know / no answer

F7: To what extent do you agree with the following statements?

Note: We have already presented some of the following statements to you in a similar form in one of the previous questions. However, it is important for our study that you also indicate here to what extent you agree with these statements.

Scale:

- Completely disagree
- Rather disagree
- Neither
- Rather agree
- Completely agree
- Don't know / no answer

Items: *Display in random order*

- (a) I would like to reduce my meat consumption.
- (b) I plan to reduce my meat consumption.
- (c) I will reduce my meat consumption.
- (d) The people who are important to me think that I should reduce my meat consumption.
- (e) The people who are important to me would approve if I reduced my meat consumption.
- (f) The people who are important to me expect me to reduce my meat consumption.
- (g) It's entirely up to me whether I reduce my meat consumption.
- (h) I think I have enough options to reduce my meat consumption.
- (i) I believe I am in a position to reduce my meat consumption.
- (j) I am a meat eater.
- (k) I am someone who likes to eat meat with every meal.

F8: If you think about the people who are important to you, what proportion of them do not eat meat or only eat it very rarely?

Slider 0-100%

- Don't know / no answer

If F4 = "Yes" or F4 = "No" and F5a = (3) or (4)

F9: How important are the following reasons for your decision to eat less or no meat?

Scale:

- Not important at all
- Rather not important
- Neither
- Rather important
- Very important
- Don't know / no answer

Items: *Display in random order*

- (a) Animal wellbeing
- (b) Environmental/climate protection
- (c) Health
- (d) Curiosity
- (e) Social pressure
- (f) Financial reasons

F00a: Wellbeing: How satisfied are you with your diet?

- Very unsatisfied
- Rather unsatisfied
- Neither
- Rather satisfied
- Very satisfied
- Don't know / no answer

F00b: To what extent do you agree with the following statements?

Scale:

- Completely disagree
- Rather disagree
- Neither
- Rather agree
- Completely agree
- Don't know / no answer

Items: *Display in random order*

- (a) My diet is environmentally friendly and sustainable.

(b) My diet is healthy.

F10: What problems do you see in reducing your meat consumption?

Scale:

- Completely disagree
- Rather disagree
- Neither
- Rather agree
- Completely agree
- Don't know / no answer

Items: *Display in random order*

- (a) I don't know what to eat/cook without meat.
- (b) My cooking skills are not good enough to cook a delicious meatless dish.
- (c) I don't have time to deal with a low-meat diet.
- (d) I often eat out and there are few or no vegetarian alternatives in the canteen, restaurant or the like.
- (e) It's too complicated for me to eat less meat.
- (f) I don't get full from a dish without meat.
- (g) Dishes with meat are part of my tradition.
- (h) My immediate environment would not accept it if I ate less meat.
- (i) I don't want to give up the taste of meat.
- (j) It is too expensive to give up meat.
- (k) I often choose products/dishes with meat out of habit or often prepare dishes with meat out of habit.
- (l) No answer.

F11: Please sort the following foods according to the CO2 emissions they cause.

Items: *Display in random order*

- 100g Beef
- 100g Pork
- 100g Chicken
- 100g Milk

- 100g Apples
- 100g Tomatoes
- 100g Tofu

PK2: To what extent do you personally agree with the following statements?

Scale:

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree
- Don't know/no answer

Items: *Display in random order*

- It worries me when I think about the environmental conditions our children and grand-children will probably have to live in.
- There are natural limits to growth that our industrialized world has long since reached or exceeded.
- Environmental protection should be a priority for Germany, even if it impairs economic growth.

PK4: In the following section, we would like to ask you to indicate the extent to which you agree with the statements on a scale from 1 (strongly disagree) to 7 (strongly agree).

Scale:

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree
- Don't know/no answer

Items: *Display in random order*

- I have little control over the things that happen to me.
- There is no solution at all to some of my problems.

- There is little I can do to change the many important things in my life.
- I often feel helpless in dealing with life's problems.
- Sometimes I feel that I am being bossed around in life.
- What happens to me in the future depends largely on me.
- I can do anything I really set my mind to.

PK5: The following statements may apply to you to a greater or lesser extent. Please indicate how much each statement applies to you.

Scale:

- Does not apply at all (1)
- Does not apply very much (2)
- Somewhat true (3)
- Mostly true (4)
- Completely true (5)
- Don't know / no answer

Items: *Display in random order*

- I always remain calm and objective during arguments.
- When I talk to someone, I always listen attentively.
- Even when I am stressed, I always treat others in a friendly and courteous manner.
- I have taken advantage of someone in the past.
- I have thrown trash on the ground or on the street in the past.
- Sometimes I only help someone if I can expect something in return.

3.2 Follow-up Questions

If F0a in baseline survey = "everything, both plant and animal products"

You have indicated that you eat both plant and animal products.

If F0a in baseline survey = "rarely meat/flexitarian"

You have indicated that you rarely eat meat or have a flexitarian diet.

For both groups ("everything" and "rarely meat/flexitarian"):

F1_freq: How many meals with meat have you eaten in the last week? Please think about your breakfast, lunch and dinner as well as snacks.

_____ Meals

F1 [Query meat consumption]

F4_FU: Have you changed your meat consumption since the last survey?

- (1) No, I have not changed my meat consumption.
- (2) Yes, I ate a lot more meat.
- (3) Yes, I ate a little more meat.
- (4) Yes, I ate a little less meat.
- (5) Yes, I ate a lot less meat.
- (6) Yes, I currently do not eat meat at all.
- (7) Don't know / no answer

If F4_FU = (1), (2) or (3)

F5a [State of change]

If F4_FU = (4) or (5)

F5b [State of change]

If F4_FU = (6)

F5c: State of change

Which of the following statements best describes how you feel about your current meat consumption?

- (1) I currently do not eat meat at all, but I don't think it is possible to keep this up.

(2) I currently do not eat meat at all and am happy with that.

(3) Don't know / no answer

F7

If F4_FU = (4), (5) or (6) OR F4_FU = (1), (2) or (3) and F5a = (3) or (4)

F9

If F4_FU = (4), (5) or (6)

F10_FU:

F00a:

F00b:

F10:

F10a: Are there other things or circumstances that make it difficult for you to reduce your meat consumption or maintain your reduced consumption?

- _____
- No
- Don't know

If F4_FU = (4), (5) or (6)

F12_FU: How did you replace the portions of meat you used to eat or what did you eat instead?

Multiple choices possible, items in random order

- I replaced meat with meat substitutes (e.g. tofu, soy mince, seitan, vegetarian sausage, vegetarian mince).
- I ate more fruit and vegetables.
- I ate more cereals (e.g. pasta, rice, quinoa, couscous, bread).
- I ate more dairy products (e.g. cheese, yogurt, quark).
- I ate more eggs.
- I ate more pulses (e.g. beans, lentils, peas, soy).
- I ate less overall.
- I ate more fish and seafood.
- Other foods
- Don't know / no answer

3.3 Additional Questions for Follow Up 1

If Group "Information"

NL1_Info: As part of our research project, we have sent you various newsletters containing information on climate and environmentally friendly nutrition over the last few weeks. Have you read these newsletters? If you do not know exactly how many newsletters you have read, please estimate.

- No, none of the newsletter (1)
- Yes, ___ newsletter(s) (2)
- No answer (3)

If Group "Support"

NL1_Support: As part of our research project, we have sent you various newsletters containing recipes and tips on climate and environmentally friendly nutrition over the last few weeks. Have you read these newsletters? If you do not know exactly how many newsletters you have read, please estimate.

- No, none of the newsletter (1)
- Yes, ___ newsletter(s) (2)
- No answer (3)

If Group "Information + Support"

NL1_Kombi: As part of our research project, we have sent you various newsletters containing information, recipes and tips on climate and environmentally friendly nutrition over the last few weeks. Have you read these newsletters? If you do not know exactly how many newsletters you have read, please estimate.

Scale:

- No, none of the newsletter (1)
- Yes, ___ newsletter(s) (2)
- No answer (3)

Display items in random order

- Information newsletter
- Recipe and tips

If Group "Support" AND if NL1_Support = (2) or (3) OR if group "Information + Support" AND NL1_Kombi = (2) or (3) for item "recipe and tips"

NL2: Have you tried one or more of the recipes in the newsletters?

- No
- Yes, 1-2 recipes
- Yes, 3-5 recipes
- Yes, more than 5 recipes
- No answer

If Group "Information" AND if NL1_Info unequal to "No"

NL3_Info: Finally, we are interested in your opinion on the newsletters. How did you like them? Do you have any suggestions for improvement? Do you think the information can motivate people to eat in a more climate and environmentally friendly way?

If Group "Support" AND if NL1_Info unequal to "No"

NL3_Support: Finally, we are interested in your opinion on the newsletters. How did you like them? Do you have any suggestions for improvement? Do you think the recipes and tips can help people to eat in a more climate and environmentally friendly way?

If Group "Information + Support" AND if NL1_Kombi unequal to "No" for both items

NL3_Kombi: Finally, we are interested in your opinion on the newsletters. How did you like them? Do you have any suggestions for improvement? Do you think that the information, recipes, and tips can motivate or help people to eat in a more climate and environmentally friendly way?

3.4 Additional Questions for Follow Up 2

If Group "Information"

NL1_Info: As part of our research project, we have sent you various newsletters containing information on climate and environmentally friendly nutrition over the last few weeks. Have

you read these newsletters? If you do not know exactly how many newsletters you have read, please estimate.

- No, none of the newsletter (1)
- Yes, ___ newsletter (2)
- No answer (3)

If Group "Support"

NL1_Support: As part of our research project, we have sent you various newsletters containing recipes and tips on climate and environmentally friendly nutrition over the last few weeks. Have you read these newsletters? If you do not know exactly how many newsletters you have read, please estimate.

- No, none of the newsletter (1)
- Yes, ___ newsletter (2)
- No answer (3)

If Group "Information + Support"

NL1_Kombi: As part of our research project, we have sent you various newsletters containing information, recipes and tips on climate and environmentally friendly nutrition over the last few weeks. Have you read these newsletters? If you do not know exactly how many newsletters you have read, please estimate.

- No, none of the newsletter (1)
- Yes, ___ newsletter (2)
- No answer (3)

Display items in random order

- Information newsletter
- Recipe and tips

If Group "Support" AND if NL1_Support = (2) or (3) OR if group "Information + Support" AND NL1_Kombi = (2) or (3) for item "recipe and tips"

NL2: Have you tried one or more of the recipes in the newsletters?

- No
- Yes, 1-5 recipes

- Yes, 6-20 recipes
- Yes, more than 20 recipes
- Don't know / No answer

If Group "Information" AND if NL1_Info unequal to "No"

NL3_Info: Finally, we are interested in your opinion on the newsletters. How did you like them? Do you have any suggestions for improvement? Do you think the information can motivate people to eat in a more climate and environmentally friendly way?

If Group "Support" AND if NL1_Info unequal to "No"

NL3_Support: Finally, we are interested in your opinion on the newsletters. How did you like them? Do you have any suggestions for improvement? Do you think the recipes and tips can help people to eat in a more climate and environmentally friendly way?

If Group "Information + Support" AND if NL1_Kombi unequal to "No" for both items

NL3_Kombi: Finally, we are interested in your opinion on the newsletters. How did you like them? Do you have any suggestions for improvement? Do you think that the information, recipes and tips can motivate or help people to eat in a more climate and environmentally friendly way?

4 Calculation of Carbon Emissions

Figure 2: Back-of-the-envelope calculation of the potential reduction of carbon emissions

		Estimates in kg*	Meat type	Carbon emissions per kg based on assumed meat types	Reduction (estimate*carbon emissions)
cat1	Cold cuts	-0.014	pork	4.200	-0.059
cat2	Bratwurst	-0.066	pork	4.200	-0.277
cat3	Steak	-0.12	beef/pork/chicken	6.733	-0.808
cat4	Poultry	-0.032	chicken	3.700	-0.118
cat5	Kebab	0.031	beef/pork/chicken	6.733	0.209
cat6	Pizza	0.006	beef/pork/chicken	6.733	0.040
cat7	Salads	0.007	beef/pork/chicken	6.733	0.047
cat8	Snacks	0.018	beef/pork/chicken	6.733	0.121
					-0.845 kg per month per person
					-10.139 kg per year per person
					-713396241.2 kg per year in Germany

Carbon emissions per kg

beef	12.3
pork	4.2
chicken	3.7

[CO2 Rechner Essen & Lebensmittel - CO2-Bilanz berechnen | GoClimate](#)

Adult population in Germany

70,360,210

<https://www.destatis.de/DE/Themen/Gesellschaft-Umwelt/Bevoelkerung/Bevoelkerungsstand/Tabellen/bevoelkerung-altersgruppen-deutschland.html>

*Estimates from DiD regressions with individual and time fixed effects with pooled treatment groups and treatment periods

	Cold cuts	Bratwurst	Steak	Poultry	Kebab	Pizza	Salads	Snacks
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
FU period	0.043	-0.029	0.044	-0.042	-0.003	-0.012	-0.205***	-0.014
Treated x FU period	-0.014	-0.066	-0.120*	-0.032	0.031	0.006	0.007	0.018
Constant	0.600***	0.540***	0.811***	0.985***	0.232***	0.108***	0.790***	0.216***
No. of observations	6436	6435	6436	6436	6436	6436	6436	6436

Note: Standard errors are clustered at the individual level and reported in parentheses; *, ** and *** indicate statistical significance at the 5%, 1% and 0.1% level, respectively.

References

Bundesanstalt für Landwirtschaft und Ernährung. (2024). *Pro-Kopf-Verzehr von Fleisch sinkt auf unter 52 Kilogramm*. Retrieved October 1, 2025, from https://www.ble.de/SharedDocs/Pressemitteilungen/DE/2024/240404_Fleischbilanz.html