MEAT CONSUMPTION CAN TRIGGER INFORMATION AVOIDANCE*

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Abstract

In a laboratory experiment, we test if eating meat triggers avoidance of information concerning animal welfare, the environment, or health. We elicit, in an incentive-compatible way, participants' willingness to pay (WTP) for information regarding the consequences of meat consumption and their knowledge about them. Subjects in the treatment group are served meat before this elicitation, which arguably increases the salience of being a meat eater. Aligned with pre-registered hypotheses based on the literature on motivated beliefs and information avoidance, we observe that meat consumption increases avoidance of certain information. Specifically, eating beef raises the likelihood of avoiding information concerning the environmental impact of beef production by approximately 18 percentage points. Similarly, consuming pork increases the likelihood of avoiding information concerning health and pork by about 15 percentage points. Moreover, meat consumption raises the probability of claiming ignorance in an incentivized quiz about meat. This causal evidence shows that frequently found correlations between individuals' meat-related information and their meat consumption also operate in the non-trivial direction: consumption restricts information. Consequently, information campaigns aiming to reduce meat consumption may face limited effectiveness.

Keywords: Information avoidance, motivated beliefs, meat paradox, laboratory experiment, willful ignorance

JEL Classification Codes: C91, D83

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1 Introduction

In the last fifty years the amount of meat produced has more than tripled, exceeding 350 million tons a year. This has a significant environmental impact through greenhouse gas emissions, the use of freshwater and agricultural land.[1] Meat consumption also raises a number of questions concerning animal welfare (see, e.g., Lusk and Norwood, 2011) and concerning its consequences for health.[2] Research in recent decades has brought to light the negative externalities resulting from meat production (e.g., Tilman and Clark, 2014), and bound our climate change targets to a sharp decline in meat consumption (Hedenus et al., 2014). Despite the growing scientific consensus that governments should *aim at reducing meat consumption* in developed countries, the goal itself and the different ways to achieve it remain controversial.

Conventional approaches to foster change are taxes and information interventions. As meat taxes are politically contentious, policy makers might find it more attractive to use interventions in the form of informational campaigns. By educating consumers about the negative consequences of meat consumption, the demand for meat is expected to decrease. Recent research investigates to which extent this approach works (Epperson and Gerster, 2021; Esser et al., 2022; Jalil et al., 2020). In practice, various organizations try to increase the public awareness of animal suffering related to meat production in order to promote diets that involve less meat. The logic behind this approach is *the more you know, the less you eat*, or in Paul McCartney's words: *"If slaughterhouses had glass walls, everyone would be vegetarian."*

We have developed an experiment that challenges this approach by investigating the possibility of reverse causality. Instead of studying the trivial effect that information restricts consumption, we ask whether it is possible that consumption restricts information. Hence, this paper answers the question whether meat consumption can increase information avoidance. Using a between-subjects design in the laboratory, we test if eating meat triggers information avoidance concerning animal welfare, the environment, or health. The main finding is a possibility result: Meat consumption can indeed increase information avoidance. We find this concerning the topics beef and the environment as well as pork and health. Information

[1] The greenhouse gas (ghg) emissions from the production of animal-based food represent 57 percent of the production of food (Xu et al., 2021) and the global livestock annually represent 14.5 percent of all human-induced ghg emissions according to the work of the Food and Agriculture Organization (FAO) on climate change (https://www.fao.org/3/i6345e/i6345e.pdf accessed on 26.02.2024). Producing food in a sustainable way is hence considered as one of "the world's most pressing challenges".

[2] Processed meat has been classified as carcinogenic to humans by the World Health Organization's agency IARC since 2018.

avoidance could explain the limited effectiveness of some information campaigns. Targets of these campaigns might be not receptive to the message but avoid the information conveyed. In simpler words *the more you eat, the less you want to know*, or revising the quote of Paul McCartney: *If slaughterhouses had glass walls, [more people would avoid looking at them].*

In the laboratory, we elicit the participants' willingness to pay (WTP) for information regarding the consequences of meat consumption and their knowledge about them in an incentive-compatible way. Subjects are randomly assigned to the treatment group or to the control group. Subjects in the treatment group are served meat before this elicitation, in order to increase the salience of being a meat eater. We find first that meat consumption increases information avoidance concerning some specific topics. In particular, eating beef increases the probability of avoiding information concerning the environmental consequences of beef production by about 18 percentage points. Eating pork (and beef) increases the probability of avoiding information concerning the health consequences of pork consumption by about 15 percentage points. Second, we find that meat consumption increases the probability of indicating not to know. Respondents who tick at least once "I don't know" (IDK) at a multiple choice knowledge question forego positive (albeit small) payoffs in expectations. Still, meat consumption increases the frequency of these IDK respondents by about 11 percentage points. Although not all hypotheses turn out to be supported, this paper does provide causal evidence that meat consumption can cause information avoidance concerning meat.

These results are in line with the cognitive dissonance theory (Festinger, 1962; Loughnan et al., 2010). According to this theory, tensions between beliefs (e.g., I care for animals or the environment or my own health) and actions (I eat meat) create unpleasant emotions that individuals try to resolve. To solve, or diminish, the unpleasantness generated by this tension, individuals have two routes. Either acting on behavior by cutting or reducing their meat consumption, or acting on beliefs by forming self-serving beliefs (trying to minimize the moral concerns of consuming meat for example).[3] To sustain these motivated beliefs, individuals may then avoid relevant information, notably to prevent the discomfort of being faced with conflicting information or having to update behaviors (Golman et al., 2017).

This paper contributes to several strands of literature. For the economic literature on information avoidance (see, e.g., Golman et al., 2017), our experiment shows that meat consumption

[3]Acting on beliefs may come at lower costs, but it carries the risk of making upcoming decisions suboptimal, as individuals choose their desired, or motivated, belief over an objective one (Akerlof and Dickens, 1982).

should be considered as an important application. Typical applications so far were safety at the workplace (Akerlof and Dickens, 1982), diseases (Oster et al., 2013), and financial decisions (Karlsson et al., 2009; Sicherman et al., 2016). We do not only show that meat consumption is another setting with information avoidance, but that eating meat can increase the level of information avoidance.

Second, our results speak to the economics of meat. The moral tension between beliefs and behavior concerning meat – also dubbed the "meat paradox" (Loughnan et al., 2010) – can be resolved when meat eaters systematically avoid information. In fact, the significant effects that we find are perfectly in line with the economic theory of the meat paradox (Hestermann et al., 2020), which we used to derive our hypotheses. This is informative for the question how policies can reduce the level of meat consumption, as also addressed by, e.g., Espinosa and Stoop (2021). As we establish that meat consumption can reduce the level of information about meat, the effectiveness of information policies and campaigns is limited when consumers avoid information.

Third, the non-economic literature on the meat paradox investigates the different channels through which meat eaters avoid the moral tension and cognitive dissonance created by their behavior. Two main channels for reducing the moral tension discussed in the psychology literature are the denial of the animals' minds and denial of the animals' suffering (Bastian et al., 2012; Loughnan et al., 2010). The fact that meat-eaters might avoid information related to meat as shown in our paper is an additional channel through which individuals can avoid this uncomfortable state of ambivalence and sustain their (motivated) beliefs.

The remainder of this paper is organized as follows: Section 2 relates our work to the literature. Section 3 describes the experimental design. In Section 4, results for our hypotheses are shown. We finally discuss our results and conclude in Section 5.

2 Related literature

Information avoidance often accompanies motivated beliefs given that being exposed to information can threaten beliefs (Bénabou and Tirole, 2011; Golman et al., 2017). Oster et al. (2013) show that patients at risk of having Huntington disease, an incurable hereditary disease, rarely choose to get tested which allows them to maintain optimistic beliefs. More closely related, Dana et al. (2007) as well as Grossman and Van der Weele (2017) design variations of the dictator game and observe in the lab that dictators often avoid information about the

consequence on others of their upcoming decision. They argue this allows the dictators to act self-servingly, while decreasing their moral discomfort, given they were (willfully) unaware of the consequences. Observers also judge as less antisocial dictators who decide to be uninformed and act antisocially compared to those who decide to be informed and act antisocially. This suggests that being uninformed, even if voluntarily, plays an exculpatory role.

Following the literature on motivated beliefs, Hestermann et al. (2020) develop an economic model of the "meat paradox", in which individuals form self-serving beliefs about the suffering of animals so that they avoid the guilt from their own meat consumption and still gain utility from it. In line with cognitive dissonance theory and models of self-signaling theory, individuals have a capacity to distort the information that they receive and transmit to their future self about the harm caused. In equilibrium, individuals who engage in self-deception are, as a result, information averse. In this paper, we provide causal evidence of meat consumption on information avoidance. This result is fully consistent with the contributions above, yet it had to be shown empirically. Mechtenberg et al. (2024) show that self-signaling can be at play in a real vote concerning animal welfare. Voters in the treatment group were reminded of the connection between being good to animals and being a good person, which causally affected their reported voting behavior. Epperson and Gerster (2021) conducted a lab and field experiment in which they causally show the standard direction of information impacting consumption in the lab and in the field. They found that receiving information on the living conditions of pigs in the intensive farming industry significantly decreases the subjects' propensity to consume meat on average by 6 to 9 percentage points in university restaurants and 12 percentage points in the lab. Other economists have contributed to the economic literature of meat and investigated different ways to reduce meat consumption. For example, Jalil et al. (2020) tested the effect of a 50-minute intervention (a lecture on the environmental consequences of food choices and the importance of reducing meat consumption for the treated group and a lecture on some placebo topic for the control group) on the meal purchases in a university restaurant. They found that the treated individuals reduced their meat consumption by 4.6 percentage points and increased the consumption of plant-based alternatives by 4.2 percentage points. These effects remained persistent throughout the academic year. In another randomized controlled trial, Haile et al. (2021) used an animal-advocacy pamphlet (treatment) to see its impact on meat consumption but found no aggregate effects in the short and long run. Yet, when disaggregating by time and gender they found 1.6 percentage point reduction in beef consumption for women

and a 2.4 percentage points reduction in fish and poultry for men. While these authors have tried to increase awareness and knowledge of the consequences of meat consumption and importance of reducing meat intakes through different interventions, others have paved the way for assessing the effectiveness of information campaigns. Espinosa and Stoop (2021) in particular have constructed an information campaign effectiveness index which predicts the effectiveness of a specific information campaign. They found that information campaign for animal-based diets are prone to the highest information resistance among the three topics tested (immigration, animal-based diets and alcohol consumption). The information resistance for animal-based diets is 12.4 percent whereas it is inexisting for alcohol consumption and immigration. Our results complement this insight by showing that not only people are resistant to process information about negative consequences of meat consumption, but also that made salient of their meat consumption individuals are more prone to avoid it in the first place. Similarly, Epperson and Gerster (2021) found that 30 percent of subjects avoid information on the living conditions of pig in the intensive farming industry. Jointly, these findings have strong policy consequences because the success of an information campaign is restricted by the avoidance of and resistance to information of the targeted population.

Meat has been of interest to many disciplines, from psychology, agriculture to economics. Rozin (2007) declared that "*meat should be of a special interest to psychologists because it is a quintessential example of the interesting and important state of ambivalence*". Indeed, while the consumption of meat increases in most countries, the expenditures on pets and the legal rights we are willing to allocate them increase as well (APPA, 2024; Loughnan et al., 2014; Ruby, 2012; Sans and Combris, 2015). As explained through the meat paradox, we care about animals but we also love eating meat, which results in some uncomfortable moral tension that we might want to alleviate through different mechanisms.[4] Among them, acting on beliefs is a commonly used strategy to relieve this moral tension and recent studies give stylized facts and some causal evidence to support this statement. Bastian et al. (2012) show that animals that we eat are ascribed diminished mental capacities and that meat consumers are inclined to deny minds to animals that we eat when reminded about the link between meat and animal suffering, with

[4]Rothgerber (2014) mentions eight mechanisms that allow us to alleviate this discomfort (information avoidance, dissociation, perceived behavioral change, denial of animal mind, denial of animal pain, pro-meat justifications, behavior change and reduction of perceived choice) as well as three basic mechanisms: hiding or avoiding the injury (possibly by making the victim invisible), denying one's role or responsibility in causing the harm; and denigrating the victim.

denial increasing if participants anticipate to eat meat in the direct future. Similarly, Loughnan et al. (2010) find that participants that just ate cashew nuts during their experiment are more likely to give a higher moral status and mental states to cows than participants who just ate dried beef. Bratanova et al. (2011) also find that the categorization as food of a same animal may diminish participants' perception of its capacity to suffer. These studies give fractional evidence that beliefs towards meat consumption are indeed motivated, which could then lead to information avoidance in order to maintain their beliefs and avoid cognitive dissonance.

3 Experimental design

3.1 Overview

We have designed a laboratory experiment to investigate whether meat consumption triggers information avoidance. We elicit each participant's willingness to pay for information about meat, knowledge about meat and ask for attitudes towards meat. In a between-subjects design, we exogenously vary consumption of meat by serving small portions of it to the treatment group called *T-Meat*, but not to the control group called *T-Control*. The experimental design is illustrated in Table 1. *WTP info about beef* stands for the elicitation of the willingness to pay for information about beef. Depending on this incentivized task, participants will at the end of the experiment receive information about beef or not, as we will explain in detail below. Likewise for pork. Before this last step, we elicit their attitudes and measure their knowledge about meat, as also detailed below.

The only difference between treatment and control is that the treatment group *T-Meat* is served bits of beef and pork before their willingness to pay for information about them are elicited.[5] When facing the piece of beef meat, treated participants are not aware that they will eat pork meat in a later stage. How we "served" the meat to the participants is illustrated in Figure A.1 in the appendix. The beef chips and pork sticks that we served are illustrated in Figure A.2. We have only recruited participants who have no dietary restrictions. Hence, both groups consist of omnivores. Arguably, the amount of meat consumed in the treatment only marginally changes how much meat a participant has consumed in his or her life, but it changes how long it is ago that this person has consumed meat. Hence, an interpretation of the treatment

[5] An alternative design idea is to provide the control group with vegetarian food, e.g., an apple. One downside of this alternative is that it is unclear how to choose the alternative and whether we are measuring the effects of meat consumption or the inverse effects of the other food.

T-Control		WTP info about beef		WTP info about pork	Attitudes	Knowledge	Information received
T-Meat	Eating beef	WTP info about beef	Eating pork	WTP info about pork	Attitudes	Knowledge	Information received

Table 1: Experimental design with the two treatments

is that it increases the *salience* of being a meat eater.

The treatment to serve meat does not necessarily imply that the treated have complied and eaten it. Indeed, there is the explicit option to raise the hand if unable to eat and there is the implicit option to simply not eat.[6]

3.2 Elicitation of willingness to pay for information

In order to elicit the participants' WTP for an information item, we asked the following seven questions, here in the example of animal welfare in the beef production:

[6]If non-compliance occurred frequently, an instrumental variable approach can be used to estimate the treatment effects. The random allocation to the treatment group is the instrument and eating meat (which is observable for the experimenters) is the treatment. Both forms of non-compliance happened to occur very rarely in our experiment such that there is no need to use an instrumental variable approach. Seven participants did not eat one or both pieces of meat out of the 146 observations.

Figure 1: WTP question

Notes: Participants were asked to answer these questions for six different items. These six items are: information on animal welfare in the beef production, information on the environment and beef production and information on health and beef consumption; and likewise for pork.

In the sequences of questions on an information item, there are less and less monetary benefits of accepting the item, starting with being paid 75 points, down to having to pay 75 points.[7] Consistent choices hence show a switching point where the answer switches from "Yes" to "No"; unless the true switching point is outside of this range such that all answers are "Yes" or "No".[8] These switching points are characteristic for a participant's true WTP. Table 2 shows in the second cell all theoretical true WTP that are consistent with each choice. Each choice is corresponds to an interval of possible WTP. Instead of working with these cumbersome intervals, we use two complementary measures. The first is a cardinal but only approximate measure called *WTP proxy*, as also illustrated in Table 2. It takes the midpoint of each interval; and for the extreme values (always Yes and always No) it takes a value that is equidistant to the others.

The second measure is the dummy variable *Info Avoidance* that is also displayed in Table 2.

[7] 100 points is 1 CHF (Swiss franc) which corresponds to roughly 1 USD.

[8] The choice was made consistent by design: When a participant answered one question with "No" all questions in lower lines switched to "No" too. The participant could always revise her choices before going to the next screen. The underlying assumption is that if some information item is refused at some price p, it must be refused at a higher price as well.

It takes value 1 if the participant refused the information item even when it was for free; and it takes value 0 (information seeking) if the participant accepted the information item even when it was costly.

Table 2: Representation of the WTP variable

Switch to "No"	WTP	WTPproxy	Info Avoidance
at paid 75 (always "No")	$\in (-\infty, -75]$	-87.5	1
at paid 50	$\in [-75, -50]$	-62.5	1
at paid 25	$\in [-50, -25]$	-37.5	1
at zero	$\in [-25, 0]$	-12.5	1
at price 25	$\in [0, 25]$	12.5	0
at price 50	$\in [25, 50]$	37.5	0
at price 75	$\in [50, 75]$	62.5	0
never (always "Yes")	$\in [75, \infty)$	87.5	0

The questions in Figure 1 concern an information item on animal welfare in beef production. We asked such a question for each combination of beef or pork and one of the three dimensions animal welfare, the environment or health. Of all those decisions only two – one for beef and one for pork – were randomly drawn and implemented. Implementing an accept decision meant providing this information item at the end of the experiment. Implementing a refuse decision meant providing an unrelated information item at the end of the experiment. Each item had to be opened for at least three minutes before moving to the payoff (see Appendix A.3).

3.3 Measuring knowledge

We created eight incentivized questions to elicit the participants' knowledge about meat consumption and production (see Appendix A.5). Each knowledge question had four possible answers, besides one "I don't know" answer. Among the four answers only one was correct and gave the participant points. We pointed out that guessing is a valid option by writing "If you are not sure, you can take a guess. There are no negative points for wrong answers."

We summed up the correct answers and created a *Knowledge score* which takes value 8 if the participant perfectly answered all eight questions and 0 if the participant answered no question correctly. We also created a dummy *IDK respondent* which took the value of 1 if respondent

had ticked "I don't know" at least once and the value of 0 if the respondent never answered "I don't know" in the eight knowledge questions.

3.4 Eliciting attitudes

We gathered 26 questions to elicit the participants' attitudes towards meat consumption and its justifications. Using a Likert-scale, this allowed us to know to which extent participants would agree or not to those 26 statements. The first series (13 questions) concerned the meat-eating justifications. We base our 13 questions on the papers of Ruby (2012) and Espinosa and Treich (2021). The second series of questions consisted of the remaining 13 questions and investigated the participant's personal attitudes towards the environment, the animal welfare and health. Among these 26 questions, we asked for instance the "four Ns" questions (eating meat is natural, normal, necessary and nice) as described in Piazza et al. (2015). Using those 26 questions we constructed a *Consequences score* (i.e., a score for judging negative consequences) due to meat consumption which consisted of 6 questions. Furthermore, we established a meat *Justification score* which consisted of 10 questions as proposed in Espinosa and Treich (2021). Further details on the construction of these scores are to be found in the Online Appendix.

3.5 Implementation

3.5.1 Pre-registration and Ethics approval

The experiment was pre-registered at American Economic Association's platform AEA RCT Registry with identification number AEARCTR-0008904.[9]

We received the approval of the Internal Review Board of the University of Fribourg (reference number 570 R1, 15 July 2020) and of the HEC ethics commission of the University of Lausanne (12 January 2022).

[9]All the information can be found here: https://www.socialscienceregistry.org/trials/8904. Pre-registration as currently practiced by economists varies in terms of having or not having a pre-analysis plan and, given an analysis plan, its level of stringency (Brodeur et al., 2024). We have pre-registered the experiment with an analysis plan that states the hypotheses and how they can be tested in principle without providing the details. In follow up projects with a less explorative nature it makes sense to additionally pre-register the specific tests that will be run, as it is already common in other disciplines, e.g., Psychology.

3.5.2 Recruitment and labs

The experiment was conducted in the laboratory of the University of Fribourg (FriLab) and in the laboratory of the University of Berne (Aarelab) (see pictures of the lab and computer desks in the appendices section A.6). Participants were recruited by the respective recruitment systems of these two labs, plus the University of Lausanne's laboratory (LABEX) whose particiants were also invited to the nearby FriLab. The lab experiments were programmed in oTree (Chen et al., 2016). Given this is an experiment on meat consumption, potential participants who do not consume meat were not invited by stating the participation condition that there are no dietary restrictions.

3.5.3 Pilots

In February 2022 we ran two trial sessions to test the code and the logistics of conducting the experiment.

Collection of data also started in February 2022 and ended in November 2022. We originally started with two meat treatments and a control group. However, we noticed that the number of participants was lower than expected. Therefore, we had to discontinue one of the meat treatments.[10] This change is transparently documented in the update to the pre-registration online.

3.5.4 Pre-experimental online survey

Two weeks before the lab experiment, participants filled out an online survey. The survey was computerized using Soscisurvey. The participants were asked to answer different questions on their eating behaviour (e.g., how frequent they consume different types of food). After some socio-demographic questions they faced the series of 26 questions on their attitudes. Finally, they faced a third series of the eight incentivized questions which explore the participants' knowledge. The knowledge and attitudes questions in the survey are exactly the same as the ones used in the lab two weeks later.

[10]The discontinued treatment was a variation in which meat was not immediately served but delayed to the end of the experiment.

3.5.5 Payoffs

The payoff of the participants included a fixed fee of CHF 15 (CHF 3 for the online survey and CHF 12 for the lab session). 1 CHF is about 1 USD. Participants could also gain some variable payoff, which comes from the knowledge questions on the one hand and from the implementation of the willingness to pay decisions on the other. The variable payoff theoretically ranged between CHF -1.50 and +9.50 per participant.

3.6 Hypotheses

Consuming meat may create cognitive dissonance when confronted with its consequences for animal welfare, the environment, and own health. Based on the literature on motivated beliefs (Bénabou and Tirole, 2016) and information avoidance (Golman et al., 2017), we conjecture that eating meat fosters the tendency to avoid and disregard information concerning meat, in particular concerning the negative consequences of meat consumption. Hestermann et al. (2020) formally develop this argument and our hypotheses follow more or less directly from their model.[11] (The hypotheses are also pre-registered at AEARCTR-0008904.)

3.6.1 Hypotheses on incentivized outcomes

Hypothesis 1 (info)**.** *Meat consumption lowers the willingness to pay for information about meat.*

This hypothesis is generally justified as follows: To reduce dissonance and keep a positive (self-) image, subjects who eat meat may demand less information about the consequences of meat consumption. In the lab, the treated subjects have just eaten meat. Being confronted with facts about the consequences of meat consumption, would arguably create stronger feelings of cognitive dissonance than for the control group. More technically, our treatment may trigger the information avoidance mechanism derived in Hestermann et al. (2020) and described in our footnote 11, by making salient that the treated person is a meat eater outside the lab.

[11] Formally, the model assumes a moral cost $\omega\tilde{x}c$ of consuming meat, where c is the level of consumption, $\tilde{x}$ the perceived size of the negative externalities, and ω the degree of empathy or guilt. Agents can reduce this moral cost by engaging in self-deception, which lowers belief $\tilde{x}$. Applying this model of Hestermann et al. (2020) to our experiment, the treatment literally lowers the price of a given amount of meat to zero and hence increases consumption c. This increases the benefits of self-deception and consequently its equilibrium level (their Proposition 3), which is the reason for information avoidance (their Proposition 7). One difference is that in our experiment subjects do not freely choose the level of consumption. This could reduce the empathy/guilt (ω) they feel and hence we would rather find smaller effects.

Hypothesis 2 (knowledge)**.** *Meat consumption hampers knowledge concerning meat.*

This hypothesis is generally justified as follows: If meat eaters disregard and downplay information about negative consequences of meat consumption, this may come at the cost of reduced accuracy of their knowledge about meat. In the lab, we do not affect a participant's knowledge about meat before measuring it, but potentially what she remembers and how she displays her knowledge.[12] Knowledge hampering then manifests in a meat consumption quiz, where treated individuals may exhibit lower performance or more frequently express not to know.

In addition to the two hypotheses on incentivized outcomes *info* and *knowledge* above, we registered two hypotheses on attitudes, which were measured in a non-incentivized way.

3.6.2 Hypotheses on non-incentivized outcomes

Hypothesis 3 (negative consequences)**.** *Meat consumption lowers estimation of its negative consequences.*

This hypothesis is generally justified as follows: To reduce dissonance and keep a positive (self-) image, subjects who eat meat may disregard and downplay information about negative consequences of meat consumption.

Hypothesis 4 (meat justifications)**.** *Meat consumption fosters meat justification attitudes.*

This hypothesis is generally justified as follows: Agreeing to meat justification arguments (such as, it is natural, normal, necessary, or nice to eat meat) may relax dissonance between meat consumption and its negative consequences and help preserve a positive (self-)image.

4 Results

Table 3 provides descriptive statistics of the main variables. The first variable *T_Meat* is the treatment which is 1 for those in the treatment group and 0 for the control group. The next three variables are the main control variables: *Female, Age, Lab dummy*. The remaining variables are the main outcome variables.

[12] Indeed, there is a stream of literature, starting with Bénabou and Tirole (2002), that assumes imperfect memory to work self-servingly to some extent.

Variable	Obs	Mean	Std. Dev.	Min	Max
T_Meat	146	0.62	0.49	0	1
Female	145	0.60	0.49	0	1
Age	146	23.56	4.33	19	46
Lab dummy	146	0.45	0.50	0	1
WTP info about beef	146	20.15	34.37	-62.5	87.5
WTP info about pork	146	18.55	34.60	-87.5	87.5
Info avoider - beef	146	0.28	0.45	0	1
Info avoider - pork	146	0.31	0.46	0	1
Knowledge score	146	4.62	1.50	1	8
IDK respondent	146	0.13	0.34	0	1
Consequences score	146	4.81	0.71	2.83	6.33
Justification score	146	3.39	0.99	1.10	5.80

Table 3: Descriptive statistics of main variables.

Notes: The variable *Lab dummy* is 1 for the observations from the Aare Lab in Berne and 0 for the observations from the FriLab in Fribourg. *WTP info about beef* stands for the willingness to pay proxy averaged over the three beef information items (environment, animal welfare, health). Likewise for *WTP info about pork*. *Info avoider - beef* is a dummy variable which is 1 if a respondents avoided a majority (i.e., two or three out of the three) beef information items. Likewise for *Info avoider - pork*. *Knowledge score* is the number of correct answers out of the eight knowledge questions. *IDK respondent* stands for I don't know respondent, a dummy variable which takes 0 if the participant has never ticked "I don't know" and 1 if (s)he has ticked this option at least once.

4.1 Treatment effects on information acquisition

Hypothesis 1 stipulates that treated subjects are less willing to pay for information about meat. We measure the willingness to pay with two complementary outcome variables: the *WTP proxy*, which is cardinally scaled, and the dummy variable *Information Avoidance*, which is 1 if a subject avoids information even when it is offered for free and 0 otherwise. There are three information items for each beef and pork, as we offer information about environment, animal welfare, and health for both. To aggregate the results we consider the mean of the *WTP proxy* for the three items for each beef and pork; and we call an agent information avoider for beef if (s)he avoids a majority (i.e., two or three out of the three) beef items, and likewise for pork.

The upper part of Figure 2 shows the distribution of the *WTP proxy* in a boxplot where

the mean is indicated by a triangle. From the control group to the treatment group, the mean WTP for information about beef has reduced from 23.1 to 18.3 points. This is a reduction by 4.8 points, i.e., around CHF 0.05, which is not statistically significant (one-sided t-test, Mann-Whitney U-test). The mean WTP for information about pork has reduced from 19.0 to 18.2 points which is also non-significant. Still, the boxplots indicate a shift due to the treatment. In particular, in the treatment group there seem to be more agents with a negative WTP. This is addressed by the other outcome variable: *information avoider*. As the lower part of Figure 2 shows, the treatment increases the frequency of information avoiders from 20% to 33% for beef, which is statistically significant (one-sided Fisher exact test: $p = 0.053$, Chi^2-test: $p = 0.073$). Moreover, the treatment increases the frequency of information avoiders from 23% to 36% for pork, which is at the edge of being statically significant (one-sided Fisher exact test: $p = 0.082$, Chi^2-test: $p = 0.116$). Given the weak significance and the fact that both information avoider variables are based on three dimensions (environment, animal welfare, health), we next investigate whether our treatment can really trigger information avoidance and which information items (environment, animal welfare or health) drive this result.

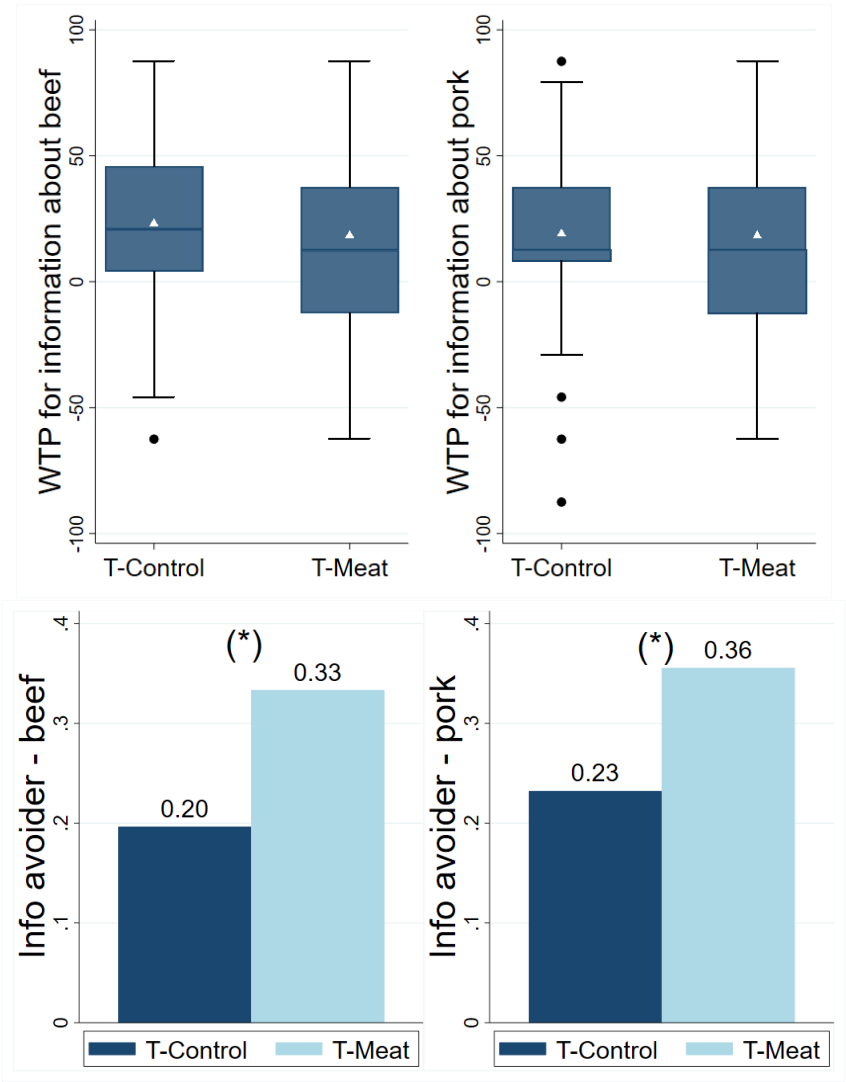


Figure 2: WTP proxy and information avoiders – beef and pork

Notes: In the upper part, the boxplot depicts the distribution of the *WTP proxy* (averaged for each subject over the three information items for beef, respectively pork), where the triangle represents the mean of the distribution. In the lower part, the dummy variable *info avoider* is 1 if a subject avoided information in at least two out of three questions concerning beef, respectively pork. The stars come from the one-sided Fisher's exact test performed and express * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. n=146.

Figure 3 shows the frequency of information avoidance for each information item separately. It reveals that eating meat triggers information avoidance for information about beef & environment, pork & animal welfare, and pork & health (one-sided Fisher exact test).

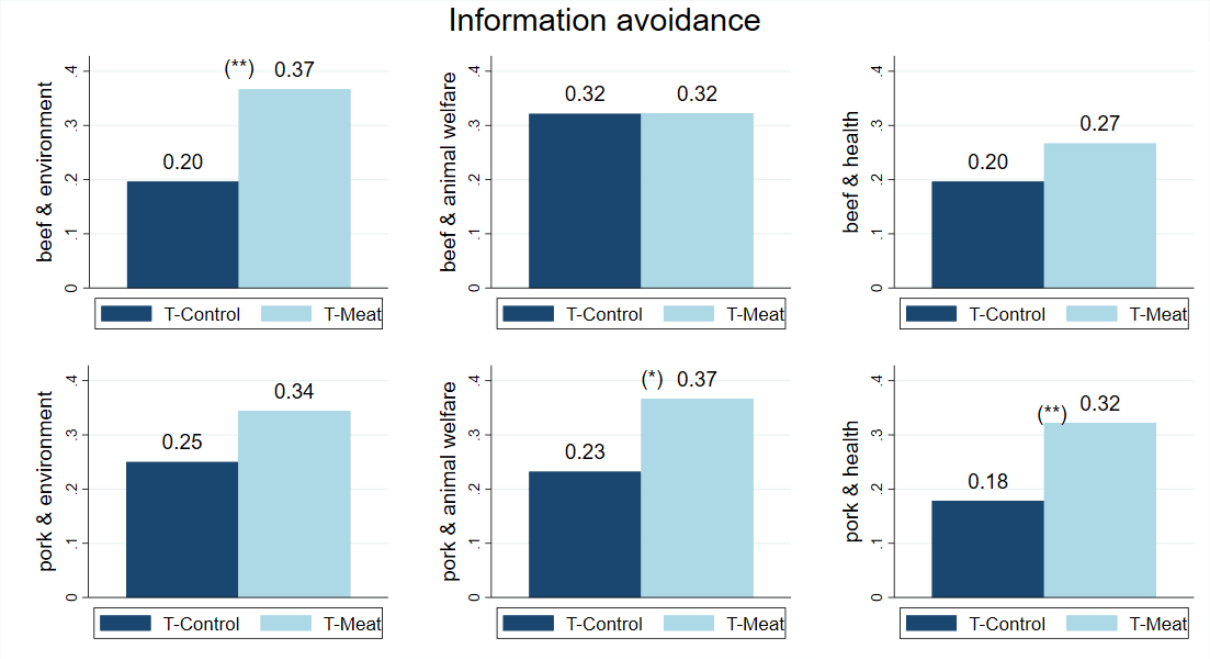


Figure 3: Information avoidance by information item

Notes: The variable information avoidance reflects the proportion of participants who refused information item even if it is for free. The stars come from the one-sided Fisher's exact test performed and express
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. n=146.

So far we have tested Hypothesis 1 only with bivariate tests. Let us now run models with additional control variables. In particular, we control for age, gender and the lab in which the sessions were conducted.[13] For the dummy variables on information avoidance, we run probit regressions which are reported in Tables A.1 and A.2 in the appendix and whose marginal effects are presented in Table 4.

The tables fully confirm the previous insights. The meat treatment triggers being an information avoider for beef overall and avoiding information about the environmental aspects of beef production in particular. Considering the marginal effects, meat consumption increases the probability of becoming a beef information avoider by 14.2* p.p. and the probability of avoiding

[13]Due to the randomization of treatments, it is in principle not necessary to have control variables for causal identification. We still want to test this, as there could be differences between treatment group and control due to noise, which can be substantial given our relatively small sample size.

information about beef & environment by 17.7** p.p. For pork, meat consumption increases the probability of avoiding information about pork & animal welfare by 13.8* p.p. and the probability of avoiding information about pork & health by 15.0* p.p. (Overall becoming a pork information avoider would increase by 12.7 p.p., but is not significant, $p = 0.114$.)

The effects are not diminished in size or significance by the control variables. Adjusting for multiple hypothesis testing by the Romano-Wolf correction, the effects on beef & environment, and largely the effects on pork & health remain significant, while this is not the case for pork & animal welfare. Hence, we conclude concerning Hypothesis 1 that we do not find that meat consumption lowers the *WTP proxy*, but it does significantly lower the probability of seeking information for specific information items.

Result 1 (Information)**.** *Meat consumption increases information avoidance concerning beef & environment; and concerning pork & health.*

While we have been ex ante agnostic about which dimensions are more or less prone to be affected by our treatment, as the theory did not provide us with much guidance on this, we observe that the results are ex post plausible: For beef, epitomy of red meat, a major concern is the environment; for pork in the form of the rich salami sticks, health is a natural concern; animal welfare for cows in Switzerland does not appear to be major concern.

Concerning the control variables, Tables A.1 and A.2 in the appendix indicate that information avoiding seems to be more frequent among older participants, an observation that we will explore a bit further below.

Table 4: Information avoidance for beef and pork: marginal effects of the probit models

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Beef info-avoid.	Beef info-avoid.	Beef Env. info-avoid.	Beef Env. info-avoid.	Beef A-W info-avoid.	Beef A-W info-avoid.	Beef Health info-avoid.	Beef Health info-avoid.
T_Meat	0.142*	0.147*	0.177**	0.182**	0.000794	-0.00360	0.0717	0.0868
	(0.0784)	(0.0821)	(0.0805)	(0.0845)	(0.0795)	(0.0846)	(0.0737)	(0.0761)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	146	145	146	145	146	145	146	145
	Pork info-avoid.	Pork info-avoid.	Pork Env. info-avoid.	Pork Env. info-avoid.	Pork A-W info-avoid.	Pork A-W info-avoid.	Pork Health info-avoid.	Pork Health info-avoid.
T_Meat	0.127	0.135	0.0962	0.0859	0.138*	0.149*	0.150*	0.176**
	(0.0801)	(0.0835)	(0.0797)	(0.0829)	(0.0807)	(0.0838)	(0.0774)	(0.0809)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	146	145	146	145	146	145	146	145

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: "Beef info-avoid." stands for the dummy variable *beef info avoider*, which is 1 if a subject avoided information in at least two out of three questions concerning beef. Likewise for pork. "Beef Env. info-avoid" stands for the dummy variable that is 1 if a subject refused the information item concerning beef & environment even if it was for free.

4.2 Treatment effects on knowledge

Hypothesis 2 stipulates that meat consumption hampers knowledge concerning meat. We measured the participants' knowledge by asking them eight incentivized questions (listed in Appendix A.5). For each question, they could tick one out of four different answers or tick "I don't know" (IDK). We defined the *Knowledge score* as the number of correct answers. When looking at the mean knowledge score (upper part of Figure 4) we do not find any reduction. However, when looking at the frequency of the IDK respondents, i.e., respondents who tick at least once "I don't know", we found that this frequency increases significantly (one-sided Fisher exact test: $p = 0.024$, Chi^2-test $p = 0.03$) as shown in the lower part of Figure 4.

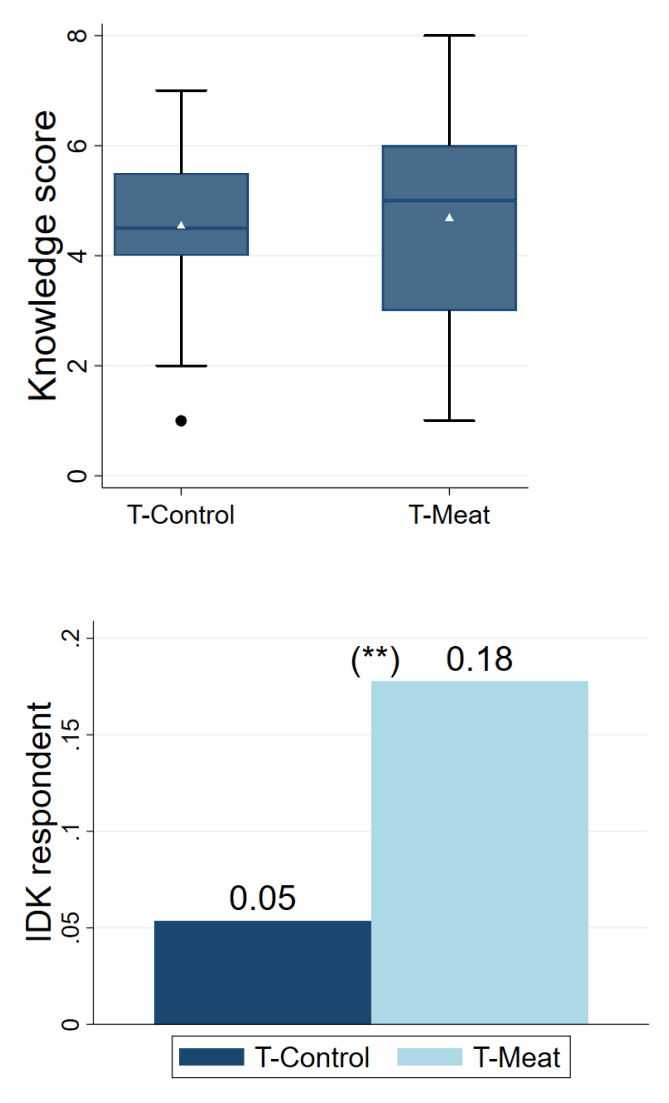


Figure 4: Knowledge score and IDK respondent

Notes: In the upper part, the boxplot depicts the distribution of the variable *Knowledge score*, where the triangle stands for the mean. In the lower part, the variable *IDK respondent* stands for I don't know respondent, a dummy variable which takes 0 if participant has never ticked "I don't know" and 1 if (s)he has ticked this option at least once in the knowledge questions. The stars come from the one-sided Fisher's exact test performed and express * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. n=146.

After this bivariate test, we further test this result with a probit regression. The marginal effects are presented in Table 5 and the raw coefficients together with the coefficients of the control variables are reported in Table A.3 in the appendix. Since the knowledge questions

have already been asked in the online survey before the experiment, we can also control for whether a participant was an "I don't know" respondent before the treatment. Model 3 of Table 5 only uses this control variable and Model 4 adds the usual control variables (*Female, Age, Lab Dummy*). All results confirm the insights from the bivariate tests. Meat consumption increases the probability of becoming a "I don't know" respondent. Without control variables this effect is of the size 13.5** p.p. The control variables do not reduce significance of this effect and leave its estimated marginal effect above 10 p.p.

Hence, we conclude concerning Hypothesis 2 that meat consumption does not significantly lower the knowledge about meat, but it does significantly increase the probability of ticking "I don't know".

Table 5: Marginal effects for IDK respondent

	(1)	(2)	(3)	(4)
	IDK respondent	IDK respondent	IDK respondent	IDK respondent
T_Meat	0.135**	0.157***	0.102**	0.108**
	(0.0592)	(0.0576)	(0.0427)	(0.0439)
Controls	no	yes	no	yes
Survey IDK resp.	no	no	yes	yes
Observations	146	145	146	145

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: *IDK respondent* stands for I don't know respondent, a dummy variable which takes 0 if participant has never ticked "I don't know" and 1 if (s)he has ticked this option at least once in the knowledge questions. Model (1) includes no controls and no variable *Survey IDK respondent*. Model (2) includes controls but no variable *Survey IDK respondent*. Model (3) includes no controls but includes the variable *Survey IDK respondent*. Finally, Model (4) includes controls and the variable *Survey IDK respondent*.

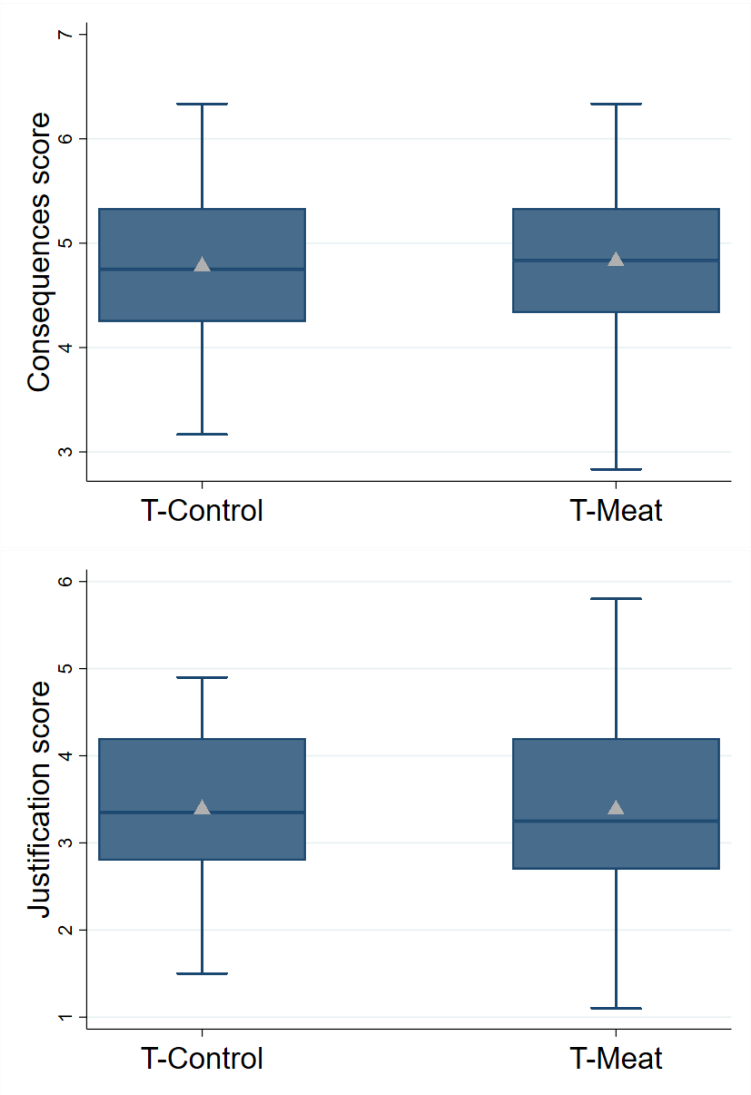
Result 2 (Knowledge)**.** *Meat consumption increases the probability of indicating not to know.*

4.3 Treatment effects on attitudes

We found no significant results for Hypothesis 3 and Hypothesis 4, i.e., no effect of meat consumption on attitudes was observed. In particular, the mean *Consequences score* does not decrease significantly (*t*-test) and the mean *Justification score* does not increase significantly

(*t*-test). Figure 5 shows the distribution of the *Consequences score* and the *Justification score* by treatment. Both scores look alike for the treatment and control group.[14]

Figure 5: Meat consequences score and meat justification score.



Result 3 (Attitudes)**.** *No effect of meat consumption on attitudes found.*

[14]We will discuss below, why we think the treatment may have been too weak to change the displayed attitudes.

4.4 Explorative results

Besides the test of the causal hypotheses, our experiment also allows us to explore some cross-sectional correlations. Caution: The results in this last subsection are not based on exogenous variation and they are not pre-registered. Still, they are informative by showing which variables information avoidance is associated with and by showing how the frequency of eating meat outside the lab correlates with our main variables.

Higher age is associated with lower willingness to pay for meat information, more information avoidance and a higher probability to be an IDK respondent. This can be seen in Table 6 that collects pairwise correlation coefficients between the main outcome variables and four control variables (and it can be seen in regression Tables A.1, A.2 and A.3 in the appendix).

We measure meat consumption outside the lab in the online survey by asking how often they have eaten white meat, respectively red meat, in the past month (the exact question and scale is in the Online Appendix). As Table 6 reveals, white meat consumption (outside the lab) correlates negatively with WTP for information about meat and positively with information avoidance (in the lab); whereas the consumption of red meat and the consumption of white meat both negatively correlate with the *Consequences score*, and positively with the *Justification score*. These observations are supportive for the external validity of our lab experiment. It is those who eat more meat (outside the lab) who tend to avoid information about meat, justify its consumption and downplay its negative consequences. Similar correlations are found for right-wing political orientation, but not for gender.

	Female	Age	Right wing	Red meat	White meat
WTP info about beef	0.0778	-0.2424***	-0.1369	-0.0492	-0.2067**
WTP info about pork	0.0699	-0.2010**	-0.1601*	-0.0400	-0.1890**
Info avoider - beef	0.0125	0.2575***	0.1548*	0.0683	0.1398*
Info avoider - pork	-0.0913	0.1879**	0.1749*	0.0664	0.2086**
Knowledge score	-0.1785**	0.0499	-0.0300	0.0247	-0.0574
IDK respondent	-0.0167	0.2608***	-0.0457	-0.1276	0.0327
Consequences score	0.0352	-0.0037	-0.5589***	-0.3501***	-0.2979***
Justification score	0.0118	0.0214	0.4827***	0.4523***	0.4550***

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Pairwise-correlation coefficients

Notes: Right-wing stands for the political orientation as an answer to the question "Where do you view yourself on the political spectrum," where 1 is "far left" and 7 is "far right." Red (white) meat stands for the amount of white (red) meat consumed in the past month, where 1 is "never" and 7 is "more than once a day".

Result 4 (Explorative)**.** *Age correlates positively with information avoidance and indicating not to know. Consumption of meat outside the lab as well as favoring a right-wing political orientation both correlate negatively with attitudes on meat consequences and positively with meat justification attitudes.*

Recall that only meat eaters were invited to our study. The correlation between the level of meat consumption and information avoidance as well as attitudes can be expected to be stronger in a population that also includes vegetarians.

5 Discussion and conclusion

Meat consumption is increasingly understood to be detrimental to the environment, animal welfare, and personal health. Information campaigns conveying these research findings, are assumed to decrease meat consumption. We wonder if meat eaters really want to receive such information, even if it is provided for free. For this purpose, we designed an incentivized lab experiment where participants were randomly assigned to a control and a treatment group. The

difference between the two groups is that the treated participants were asked to eat a beef chip and a pork stick at the beginning of the lab session, which arguably makes more salient that they are meat eaters.

Our results show that meat consumption triggers information avoidance. In particular, subjects who were served beef were more often avoiding information about the environmental consequences of beef production. Subjects who were served pork (and beef) were more often avoiding information about health consequences of pork and tended more to answer "I don't know" when asked knowledge questions about meat. Considering these results, there might be a potential reinforcing effect: some people avoid information on meat consumption, which leads to higher meat consumption levels, which further increases their information avoidance, etc. While these results support our theoretically founded hypotheses, we did not find the likewise predicted effects of meat consumption on (non-incentivized) attitudes and beliefs, although these do correlate with the frequency of meat consumption outside the lab.

Interestingly, our results show that even a temporary, passive and very small change in consumption induces detectable effects in information avoidance. Indeed, the small portions served are unlikely to change the amount of meat a participant has consumed in his or her life. Additionally, subjects do not actively initiate the consumption of meat but rather passively receive the option and suggestion to eat it by being served. Thus, feelings of responsibility and guilt should not be as strong. Still, our treatment can affect the treated, probably because it changes the salience of being a meat eater, which in turn would lead to strongly felt cognitive dissonance when confronted with information about negative consequences of meat consumption.

Our findings carry several policy implications. First, simply offering free information on the consequences of one's behavior may not be sufficient to change behavior, as certain individuals may actively seek to avoid it. Hence, policy makers can consider to reward information acquisition or to increase the cost of information avoidance. Second, it is crucial to gain insights on which individuals are prone to avoid information. Our results suggest that it could be those individuals that engage in the problematic behavior, which necessitates targeting the incentivized information specifically to them. This result resembles one insight of Epperson and Gerster (2021) which suggests that individuals who avoid information are particularly responsive to it. This might explain the potential ineffectiveness of information provision, even when the information is offered at no cost. Third, it is crucial to understand under which circumstances information is avoided. If the effect of meat consumption on information

avoidance is only strong in the very short run, then information about the consequences of meat consumption should rather be withheld during meal times.

How long the effect of meat consumption on information avoidance lasts and whether it is key for the limited effectiveness of information campaigns for meat consumption are due to further research. In this paper, we establish that the effect exists, a possibility result. Future research can build on our findings.

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A Appendices

A.1 Information avoidance for beef: probit model

Table A.1: Information avoidance for beef: probit model

	(1) Beef info-avoid.	(2) Beef info-avoid.	(3) Beef Env. info-avoid.	(4) Beef Env. info-avoid.	(5) Beef A-W info-avoid.	(6) Beef A-W info-avoid.	(7) Beef Health info-avoid.	(8) Beef Health info-avoid.
T_Meat	0.424*	0.442*	0.514**	0.529**	0.00221	-0.0101	0.232	0.286
	(0.235)	(0.248)	(0.234)	(0.247)	(0.222)	(0.237)	(0.238)	(0.251)
Female		0.135		0.0695		0.157		0.366
		(0.238)		(0.234)		(0.231)		(0.249)
Age		0.0793***		0.0782***		0.0945***		0.0698***
		(0.0275)		(0.0277)		(0.0284)		(0.0262)
Lab_dummy		-0.0117		0.0131		0.0238		-0.239
		(0.238)		(0.235)		(0.234)		(0.245)
_cons	-0.854***	-2.824***	-0.854***	-2.763***	-0.464***	-2.800***	-0.854***	-2.673***
	(0.192)	(0.719)	(0.192)	(0.721)	(0.174)	(0.722)	(0.192)	(0.692)
N	146	145	146	145	146	145	146	145

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

A.2 Information avoidance for pork: probit model

Table A.2: Information avoidance for pork: probit model

	(1) Pork info-avoid.	(2) Pork info-avoid.	(3) Pork Env. info-avoid.	(4) Pork Env. info-avoid.	(5) Pork A-W info-avoid.	(6) Pork A-W info-avoid.	(7) Pork Health info-avoid.	(8) Pork Health info-avoid.
T_Meat	0.361	0.387	0.274	0.245	0.391*	0.421*	0.459*	0.544**
	(0.229)	(0.240)	(0.227)	(0.237)	(0.229)	(0.237)	(0.239)	(0.251)
Female		-0.207		-0.188		-0.108		-0.0106
		(0.227)		(0.225)		(0.225)		(0.235)
Age		0.0528**		0.0465*		0.0330		0.0464*
		(0.0262)		(0.0260)		(0.0251)		(0.0256)
Lab_dummy		-0.0821		0.118		-0.104		-0.300
		(0.231)		(0.229)		(0.229)		(0.240)
Constant	-0.732***	-1.835***	-0.674***	-1.697**	-0.732***	-1.413**	-0.921***	-1.931***
	(0.185)	(0.670)	(0.182)	(0.666)	(0.185)	(0.645)	(0.196)	(0.665)
Observations	146	145	146	145	146	145	146	145

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

A.3 Probit model: IDK respondent

Table A.3: IDK respondent (dummy)

	(1) IDK respondent	(2) IDK respondent	(3) IDK respondent	(4) IDK respondent
IDK respondent				
T_Meat	0.687**	0.894**	1.074**	1.334***
	(0.317)	(0.355)	(0.451)	(0.511)
Female		0.0212		-0.354
		(0.296)		(0.386)
Age		0.0806***		0.0290
		(0.0289)		(0.0367)
Lab_dummy		-0.506*		-0.491
		(0.307)		(0.397)
Survey IDK respondent			2.156***	2.147***
			(0.371)	(0.411)
Constant	-1.611***	-3.514***	-2.817***	-3.314***
	(0.276)	(0.825)	(0.496)	(1.049)
Observations	146	145	146	145

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: "IDK respondent" stands for I don't know respondent, a dummy variable which takes 0 if participant has never ticked "I don't know" and 1 if (s)he has ticked this option at least once in the knowledge questions. Model (1) includes no controls and no variable "Survey IDK respondent". Model (2) includes controls but no variable "Survey IDK respondent". Model (3) includes no controls but includes the variable "Survey IDK respondent". Finally, Model (4) includes controls and the variable"Survey IDK respondent".

A.4 Lab experiment screens

A.4.1 Presentation of the meat

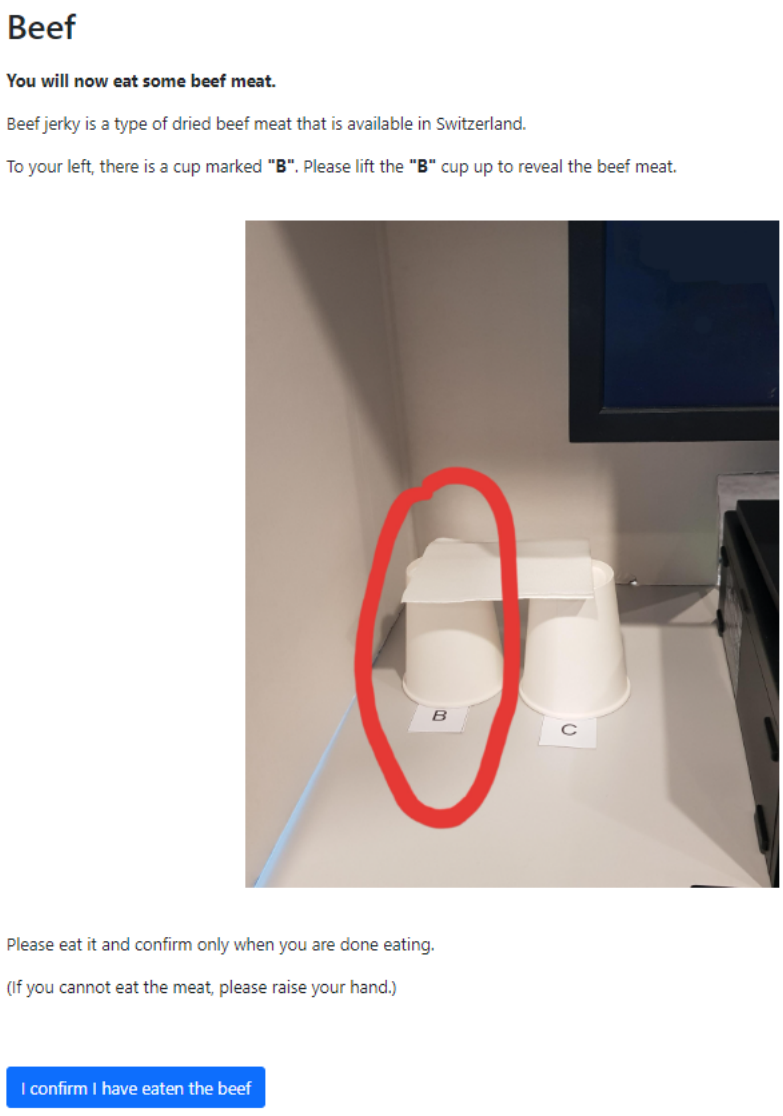

Figure A.1: Presentation of the beef chip

Figure A.2: The beef chips (left) and the pork sticks (right)

A.4.2 Willingness to pay (WTP)

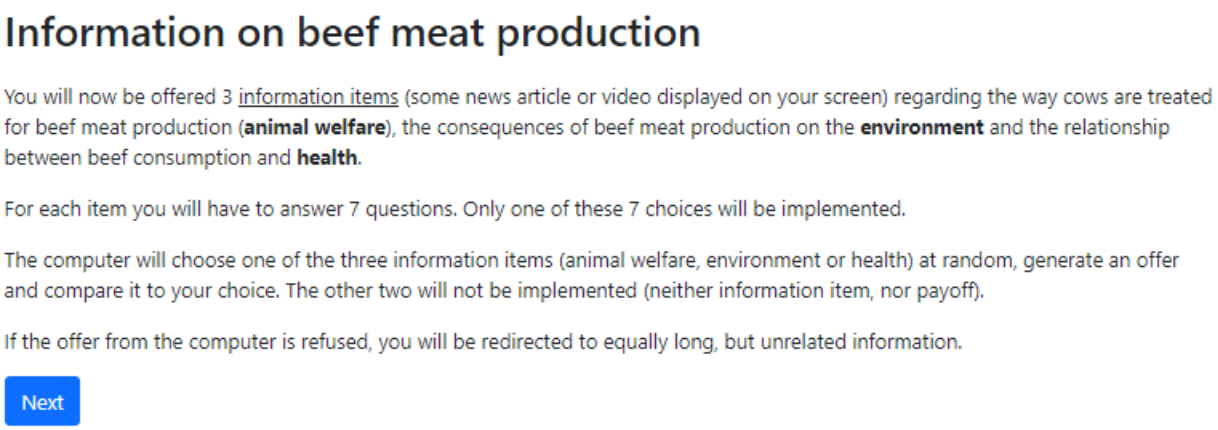

Figure A.3: Instructions on the information about beef

Figure A.4: WTP for information on beef and animal welfare

A.5 Knowledge questions

You will now face a series of 8 factual questions.

Each of these questions has one and only one right answer. Please tick the correct answer. If you are not sure, you can take a guess. There are no negative points for wrong answers.

You can gain 50 points for each correct answer.

According to the WHO, which of these are carcinogenic (increase risk of cancer)?

- (●) White meat and red meat
- ( ) White meat and processed meat
- ( ) Red meat and processed meat
- ( ) Fish and white meat
- ( ) I don't know

In Swiss farms, what is the minimum space per pig that is legally required?

- ( ) 1.8 square meter
- ( ) 3.2 square meter
- ( ) 4 square meter
- ( ) 0.9 square meter
- ( ) I don't know

According to the Swiss Confederation's nutrition strategy 2017-2021: on average, how much meat do the Swiss eat compared to what would be optimal for their health?

- ( ) Meat consumption is approximately at the right level
- ( ) Meat consumption is 3x too high
- ( ) Meat consumption is 7x too high
- ( ) Meat consumption is 2x too low
- ( ) I don't know

The production of which of the following items requires the largest land use?

- ( ) 100g of protein from beef
- ( ) 100g of protein from lentils
- ( ) 100g of protein from chicken
- ( ) 100g of protein from tofu
- ( ) I don't know

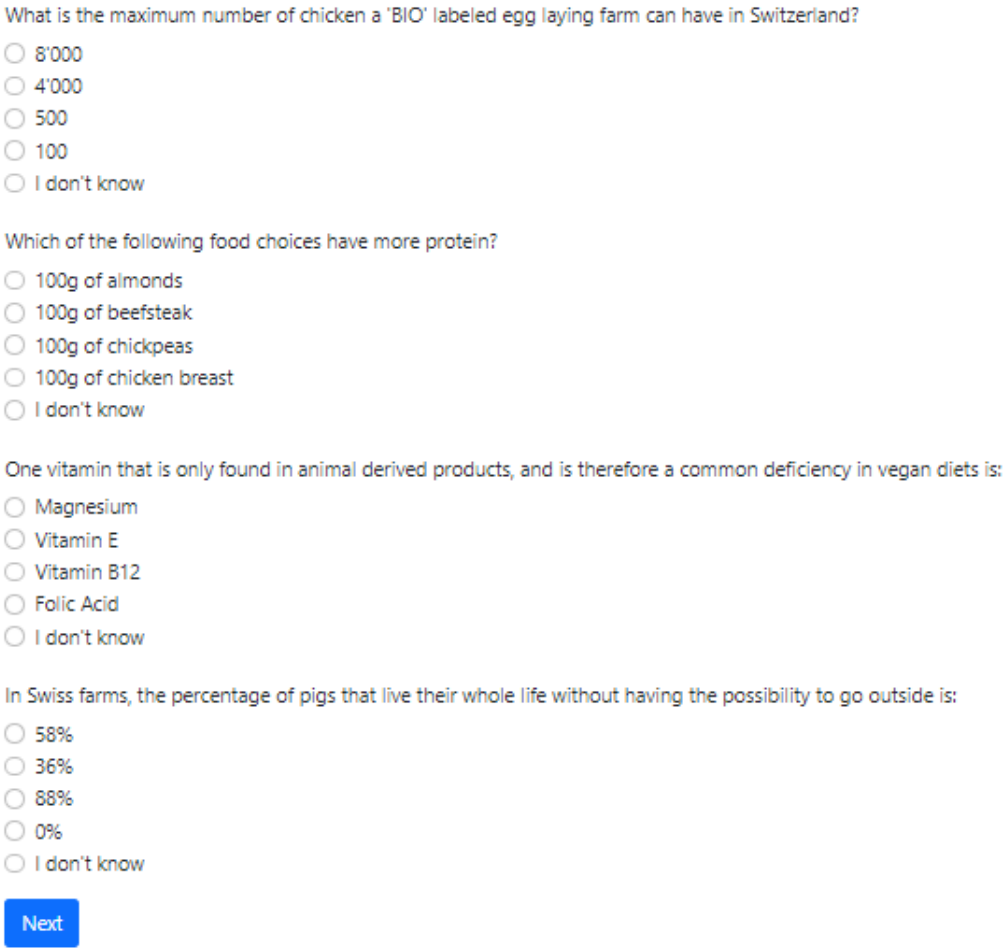

Figure A.5: Knowledge questions

A.6 Pictures of the lab and computers

Figure A.6: Lab

Figure A.7: Desk with beef and pork placed in the two cups