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ARTICLE

# Context counts: an exploration of the situational correlates of meat consumption in three Western European countries

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**Abstract**

A reduction in the demand for meat and particularly red meat has the potential to significantly enhance the sustainability and health of many people's diets. In the current work, I examine situational predictors of meat consumption in nationally representative nutrition surveys from three Western European countries: Switzerland, France and the Netherlands. More specifically, I examine whether the situational factors – the meal type, the day of the week and the location of the food consumption occasion – are predictive of whether meat and red meat are consumed. The results indicate that all three factors are linked to meat and red meat consumption with the patterns varying substantially across the different case study countries and in some cases also the gender of the consumer. The results emphasise the value of mapping situational correlates to inform situated interventions aimed at influencing meat consumption, while also highlighting important differences across both cultures and people.

**Key words:** meat consumption; red meat consumption; situational predictors; comparative analysis; France; Switzerland; the Netherlands

## Introduction

A reduction in the demand for meat and a shift to more plant-based consumption has the potential to significantly enhance the sustainability and health of people's diets (Willett *et al*., 2019). Meat and other animal-based proteins are typically significantly more resource-intensive and environmentally impactful than plant-based foods (Poore and Nemecek, 2018). The overconsumption of meat has also been linked to ill health, including cardiovascular disease and some forms of cancer (Godfray *et al*., 2018). While the above is true of all meat types, red meat consumption – including beef, veal, pork and lamb – poses particular threats to both planetary and personal health (Willett *et al*., 2019).

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Meat consumption is a behaviour that individuals have the opportunity to engage in regularly and across a variety of different contexts. However, to date, little work has considered the situational factors that predict consumption. When describing situations people often turn to the 'w' variables: what?; when?; where?; and who? (Saucier *et al.*, 2007). Investigating *what* kind of meat individuals consume across situations is important given the different relative environmental and health impacts associated with different meat types. Investigating *when* people typically eat meat is valuable as consumption may be concentrated on certain meal times during the day and/or particular days of the week. Additionally, examining *where* people eat meat can help shed light on the physical contexts in which meat consumption most often occurs. Finally, looking at consumption patterns across groups helps to understand *who* is more likely to be consuming meat in particular situations.

An understanding of the situational predictors of meat and red meat consumption can help inform the burgeoning research literature in the behavioural sciences that is focused on developing intervention strategies aimed at reducing people's meat consumption (see Harguess *et al.*, 2020 for a review). In this literature, interventions are typically developed and tested in a single situation at a single point in time, for example, exploring the effectiveness of changing the availability of, or information provided about, vegetarian options in workplace canteens (Garnett *et al.*, 2019; Weingarten *et al.*, 2022). Little attention is paid to whether the situations being targeted are those that matter most. Understanding the situations in which consumption commonly takes place will help direct intervention efforts to those situations where they can have the greatest potential impact. When further explored, situational insights can also feed into intervention design by identifying situated norms and other constraints that may be inhibiting more sustainable and healthier dietary choices (Stern, 2011, 2020).

Work that has looked at diet quality indicators and food consumption more generally indicates that food consumption follows both diurnal and weekly rhythms, as well as varying depending on who a person is with and their location (De Castro, 2004a, 2004b; Hetherington *et al.*, 2006; De Castro, 2007; Pachucki *et al.*, 2018). Other work suggests that the healthy eating strategies that individuals adopt (including, for example, increasing consumption of healthy foods or avoiding unhealthy foods) vary across contexts (Verain *et al.*, 2022), as do self-regulation efforts around diet (Bouwman *et al.*, 2022).

In the only existing situational investigation of meat consumption in a representative population sample, Horgan and colleagues (2019) find that in the UK, eating with family and eating on a Sunday increases the probability of individuals consuming meat compared to other situations. They also find that people are more likely to eat meat when eating out in restaurants and cafés. Relatedly, in a UK sample of people attempting to reduce their meat consumption, Laffan and colleagues (2023) find that people are more likely to succumb to eating meat when dining in restaurants and cafés, as well as when in friends' and family members' homes. Finally, Biermann and Rau (2020) find that people associate eating out and eating meat with treating themselves in a German convenience sample. Further work in this area can yield important insights that pertain to other countries and populations.

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Additionally, while some research has examined the psychological, social and physical correlates of eating patterns of students from different cultures (de Castro *et al.*, 1997; Wolstenholme *et al.*, 2021), further cross-cultural and comparative work exploring the importance of such factors at the general population level is needed. More specifically, it is important to take the consideration of 'where' a step further to explore whether meat and red meat consumption map onto situations similarly across cultures. If not, the country-specific behavioural mapping will be all the more important in the targeting and design of behavioural interventions.

In the current work, I present the first cross-cultural examination of the situational correlates of meat and red meat consumption. I base the analysis on three Western European countries: Switzerland, the Netherlands and France. I examine the relationships between a range of different situational cues - objective features of the situation (e.g., the location (where), the meal occasion and the day of the week (when)) - and the consumption of meat. I consider the 'what' variable in the sense that I examine the situational predictors of both meat overall and the subset of red meat. I also consider the fourth 'w' variable - who - by examining whether these contextual predictors vary across gender - a key demographic characteristic that has been linked to the consumption of animal-based proteins in previous research in the three case study countries and elsewhere (Rousset *et al.*, 2003; Prättälä *et al.*, 2007; Hayley *et al.*, 2015; Marques-Vidal *et al.*, 2015).

Diets in all three case study countries are characterised by high levels of meat consumption: the 2017 estimates of 'meat supply', a measure typically used to proxy consumption, are over 67 kg per capita annually in all three (Switzerland: 67.53 kg, the Netherlands: 75.81 kg and France: 83.04 kg compared to a global average of 43.22 kg (Ritchie and Rosado, 2023). Additionally, analysis of the consumption of animal-based proteins, which includes meat but also dairy products, in Europe suggests that Western Europeans consume more animal protein supplies than their Eastern counterparts (de Boer and Aiking, 2018), highlighting Western Europe as an important region within Europe to examine. Finally, France and Switzerland, but not the Netherlands, share overlapping food cultures (Askegaard and Madsen, 1998; Rozin, 2005). As a result, and also given their geographical proximity to one another, it is interesting to explore the extent of any cultural differences across this set of countries.

I carry out multilevel logistic regression analyses of diary-based nutrition data, examining the individual and episode-level predictors of meat consumption in representative adult populations from three countries of interest. The datasets I use are the Third French Individual and National Survey on Food Consumption 2014–15 (INCA3) data, The Swiss National Nutrition Survey (menuCH) 2014–2015 and the Dutch National Food Consumption Survey (DNFCS) 2012–2016. The results indicate that when and where a consumption episode took place are predictive of consumption. For example, meat and red meat consumption are concentrated on lunch and dinner and more likely to happen in a restaurant or café than at home in all three countries. Importantly, the contextual predictors also vary across the countries. For example, meat and red meat are more likely to be consumed at friends' or family members' homes in France and Switzerland but not in the Netherlands. Finally, the consumption patterns differ across men and women, with important differences

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emerging in relation to the importance of some but not all contextual factors explored.

In what follows, I introduce the data, present the analysis and results for each of the three country case studies and discuss the results and future directions.

## Data

The nutrition data for this study come from the national nutrition surveys of France, Switzerland and the Netherlands. All surveys provide detailed diary-based information on food consumption in a 24-hour recall format, along with contextual information including the meal type, day of the week and location. The surveys also collected detailed individual-level information on food-related issues.

### *French individual and national food consumption 2014–2015*

The INCA3 survey is a cross-sectional survey aimed at estimating the food consumption and eating habits of individuals living in France. The study was carried out between February 2014 and September 2015 among a representative sample of individuals living in mainland France. A total of 5855 individuals, divided into 2698 0- to 17-year-old children and 3157 18- to 79-year-old adults, participated in the study. The current study makes use of the adult sample (aged 18+) only. Individuals were selected according to a three-stage cluster sampling design (geographical units, households and individuals), based on the 2011 annual national census, with geographical stratification (region, size of urban area).

Data related to various issues connected to food-related, nutritional and health risk/benefit assessment were collected: consumption of foods, drinks and food supplements, eating habits, practices posing a potential health risk, knowledge and habits with regard to food. Data on physical activity and sedentary behaviour, as well as anthropometric and socio-demographic characteristics and standards of living, were also collected. To ensure national representativeness, individual weighting factors were estimated taking into account geographic and socio-economic variables.

The dietary intake of the individuals was collected over three non-consecutive days (two weekdays and one weekend day) spread over around three weeks. The 24-hour recall method was used. For the three selected days, individuals had to report their dietary intake by identifying all the foods and beverages consumed during the day or at night. They were asked to describe them in as much detail as possible and to quantify them using a picture book of food portion sizes and household measures. Interviews were conducted by telephone, using the standardised and computerised GloboDiet – a computer-directed interview programme for 24-hour recalls, by professional interviewers specifically trained in the methods and the software used. A total of 2121 adults responded to at least two dietary interviews. Full details of the survey and its methodology are available in Dubuisson *et al.* (2019).

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### The Swiss National Nutrition Survey 2014–2015

MenuCH is a cross-sectional survey carried out between January 2014 and February 2015 in Switzerland which collected anthropometric characteristics as well as data on food consumption and physical activity. The study was carried out between January 2014 and February 2015. Data were collected on 2085 participants aged 18–75 years. The stratified sampling strategy targeted a sample of individuals representative of the three main linguistic regions of Switzerland (German, French and Italian), balanced for the predefined sex and age strata within each linguistic region.

Data related to socio-demographic characteristics, health-related issues, body-weight satisfaction, cooking habits as well as eating and physical activity behaviour were collected. Anthropometric measures including body weight, height and waist circumference were measured using standardised procedures. To ensure national representativeness, individual weighting factors were estimated taking into account linguistic regions, sex, age groups and educational levels.

Individual food intake was assessed by conducting two non-consecutive 24-hour dietary recalls. The first was collected face-to-face in interviews carried out by German, French or Italian-trained dieticians in 10 study centres. The second by phone two to six weeks later. In both cases, the interviews were carried out using the standardised and computerised GloboDiet software. To start, participants provided general information about their diet; then they were asked and probed by the interviewer to remember and report the kind and amount of all foods and beverages they consumed between waking time on the preceding day and waking time on the interview day. Picture books and household measures were used as aids to help participants accurately report on their consumption. Further details of the survey and its methodology are available in Chatelan *et al.* (2017).

### The Dutch National Food Consumption Survey 2012–2016

The Dutch National Food Consumption Survey is a cross-sectional survey assessing the food consumption and activity levels of Dutch adults and children. The study was carried out between 2012 and 2016 among a sample of individuals living in the Netherlands. A total of 4313 individuals, divided into 2163 0- to 17-year-old children and 2150 18- to 79-year-old adults, participated in the study. The current study makes use of the adult sample (aged 18+) only.

The survey population was intended to be representative within each age category with regard to age and gender, region, degree of urbanisation and educational level (or the educational level of the parents/caretakers for children up to 18 years when living with their parents/caretakers). Therefore, during recruitment, the study population was monitored on these characteristics and, if necessary, the sampling was adjusted on these factors. The survey also includes weights that allow for estimates of the consumption patterns of the population living in the Netherlands.

The adults filled in a questionnaire either on paper or online which covered various background factors, such as educational level, working status, native country, family composition various lifestyle factors, such as patterns of physical

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activity, smoking, use of alcoholic beverages and various general characteristics of the diet, such as breakfast use, food frequency of fruit, vegetables, fish and dietary supplements and the use of salt during the preparation of food or at the table.

Participants then recorded food consumption in two non-consecutive 24-hour recalls, with an interval of four weeks. The data were collected by an interviewer using Globodiet. The recalls covered the period from getting up in the morning until getting up on the following day (which was, in fact, the day of the interview). Food consumption on Sunday to Friday was recalled the next day, and consumption on a Saturday was recalled the following Monday. Interview days and survey days were not planned on national and/or religious bank holidays, or when the participant was on holiday. Full details of the survey and its methodology are available in Van Rossum *et al.* (2020).

## Analysis and results

### *Descriptive statistics*

The main outcomes of interest are whether meat or red meat was eaten during a food consumption episode. To assess this, I identify and drop all consumption episodes that involve drink consumption only. This allows me to focus on food consumption episodes and create a dummy variable indicating if meat of any kind was consumed during a given food consumption occasion. I then create a second dummy variable to identify the subset of those occasions when red meat was consumed. This dummy variable takes the value one if so and zero if any other food (including other forms of meat) was consumed. The contextual predictors include meal type, day of week and location. I code the variables in each of the three datasets to make them comparable. This involves collapsing categories in some datasets such that I end up with six meal occasion categories. Breakfast, lunch and dinner refer to standard main meal types. The other categories represent snacks outside of these main meals taking place in the morning, afternoon and at night. I also have six food consumption locations that are equivalent across the three datasets. All contextual predictors represent categorical variables with 'Breakfast' (Meal type), 'Monday' (Day of the week), 'At home'(Location) acting as the reference categories. I also explore the extent to which these contextual predictors vary across gender.

First, I run basic descriptive statistics to compare the frequency of meat consumption across all three countries and across men and women within each country. Overall, the Swiss have the lowest percentage of their food consumption occasions involving meat at 23.4% compared to 25.3% in France and 24.6% in the Netherlands. The first outcome variable represents whether a particular food consumption occasion falls within approximately one-quarter of the overall food consumption episodes that involve meat. Turning to red meat consumption, both the French and the Dutch eat red meat on 6.1% of occasions, whereas the Swiss eat it on 5% of occasions. The second outcome variable reflects whether the episode in question is one of those 5–6% of consumption occasions. The differences are in line with existing findings that looked at total levels of consumption (Rousset *et al.*, 2003; Marques-Vidal *et al.*, 2015; Van Rossum *et al.*, 2020). See Appendix Table A1 for descriptive statistics.

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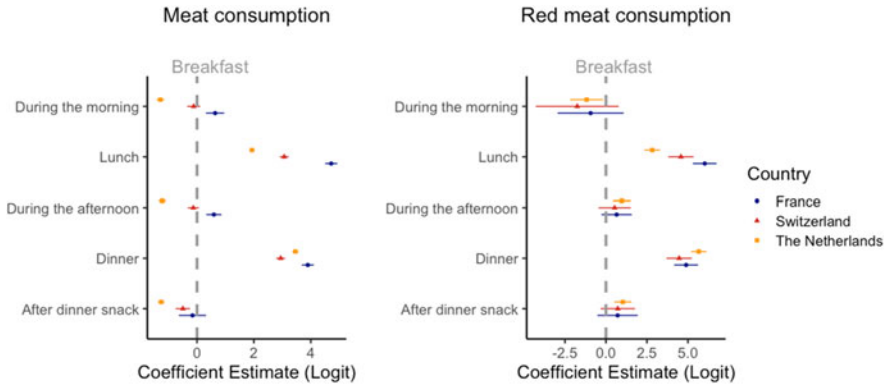


**Figure 1.** Coefficient plots for eating meat and red meat at different meal times across the three case study countries. *Note:* This figure is based on weighted samples from France (25,595), Switzerland (19,544) and the Netherlands (26,683). Lines represent the 95% confidence intervals. The reference category is Lunch.

### *Modelling the contextual correlates of meat and red meat consumption*

I then examine the contextual predictors of meat and red meat consumption. To account for the clustering of meal episodes within respondents, I carry out multilevel logistic regression analyses with participants' unique identifiers included as a random intercept. This is in line with the approach adopted by Horgan *et al.* (2019), who carried out a similar analysis of UK-based data. I use the glmer function within the lme4 package in R to conduct this analysis (Bates, 2010). See Figures 1–3 for coefficient plots of the weighted logit estimates for all three case study countries for both meat and red meat. See Appendix Tables A2–A4 for the model estimates.

I then go on to examine between country differences formally by interacting the country with the situational variables in a dataset that combines the information from all three countries. See Appendix Tables A5–A7. Additionally, I include a full specification of the models for both meat and red meat for all three countries in Appendix Table A8.

Finally, I estimate a generalised linear mixed model with a cross-level interaction between the contextual effects and gender, including a random slope coefficient for gender and a random intercept for individuals' unique identifiers (Heisig and Schaeffer, 2019). See Appendix Tables A9–A11. Across all the tables, I indicate the statistical significance of the estimate according to standard p-values using the critical values of 0.05, 0.01 and 0.001, while also highlighting estimates that are significant at the 0.05 level under within-sample Benjamini–Hochberg adjustments to limit the risk of false positives (Benjamini and Hochberg, 1995).

#### *The association between meat and red meat consumption and meal type across the three case study countries*

Meal type is associated with meat consumption across all three case study countries with people being more likely to eat meat at lunch and dinner compared to at breakfast. The magnitude of these differences varies across the three countries, however.

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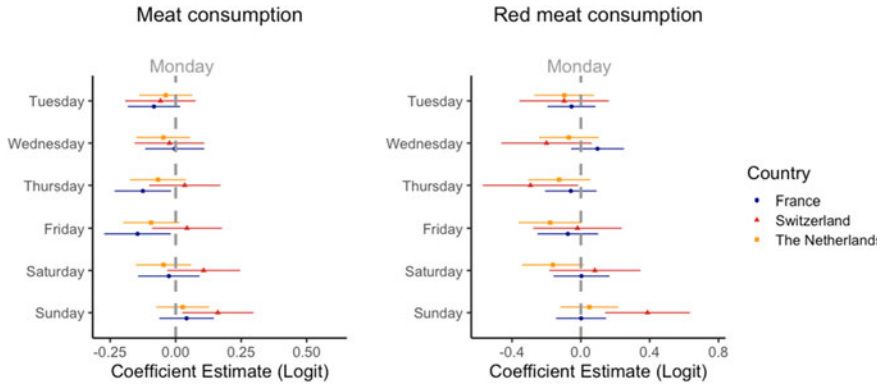


**Figure 2.** Coefficient plot for eating meat and red meat on different days of the week across the three case study countries. *Note:* This figure is based on the weighted samples from France (25,595), Switzerland (19,544) and the Netherlands (26,683). Lines represent the 95% confidence intervals. The reference category is Monday.

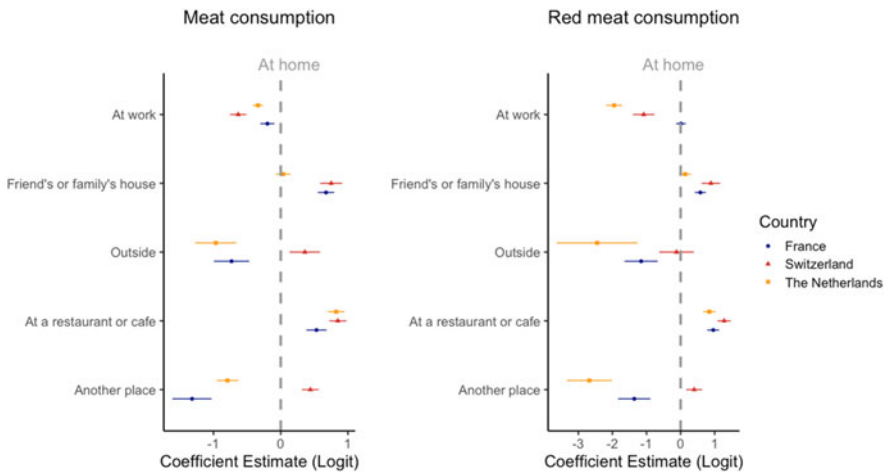


**Figure 3.** Coefficient plot for eating meat and red meat at different locations across the three case study countries. *Note:* This figure is based on weighted samples from France (25,595), Switzerland (19,544) and the Netherlands (26,683). Lines represent the 95% confidence intervals. The reference category is At home.

For example, people are much more likely to eat meat at lunch and dinner compared to breakfast in France relative to the differences in either the Netherlands or Switzerland. Across the various snack times, the results vary. For example, during the morning meat is more likely to be eaten than at breakfast in France but less likely in the Netherlands.

Meal type is also associated with meat red consumption across all three case study countries with people being again more likely to eat meat at lunch and dinner compared to at breakfast. In terms of the magnitude of the relationships, the difference in

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likelihood between breakfast and lunch in France is greater than in either of the other two countries but not at dinner. In contrast, the three snack times are no differently associated with red meat consumption than is breakfast in either France or Switzerland but people are somewhat more (less) likely to eat red meat during the afternoon or with an after-dinner snack (during the morning) than they are at breakfast in the Netherlands. See Figure 1 for the coefficient plot of the logit estimates and Appendix Tables 2 and 5 for the full meal type results.

### *The association between meat and red meat consumption and day of the week across the three case study countries*

The results indicate that meat consumption is not closely associated with the day of the week in any of the three case study countries. Meat consumption is less likely on a Thursday and Friday compared to a Monday in France and more likely on a Sunday compared to Monday in Switzerland but only the latter of these associations is significant when Benjamini–Hochberg adjustments are applied to the p-values.

Similarly, red meat consumption is not closely associated with the day of the week in any of the three countries. Red meat is significantly more likely to be eaten on Sunday compared to Monday in Switzerland, but all other associations are non-significant after Benjamini–Hochberg adjustments are applied. See Figure 2 for the coefficient plots Appendix Tables A3 and A6 for the logit estimates from the multilevel regression analysis.

### *The association between meat and red meat consumption and location across the three case study countries*

Where the food consumption takes place is predictive of meat consumption in all three case study countries. Compared to when eating at home people are consistently less likely to eat meat at work, and more likely to eat meat when eating out at a café or a restaurant, across all three countries. The magnitude of the effects varies, however. For example, eating at work is more negatively predictive of eating meat compared to at home in Switzerland than it is in France (eating at work in the Netherlands also appears to be more negatively associated but this relationship does not remain significant once Benjamini–Hochberg adjustments are applied). Additionally, eating at a restaurant or café in the Netherlands or Switzerland is more positively predictive of eating meat compared to at home than it is in France.

Differences emerge across the countries in relation to other locations. People are significantly more likely to eat meat when eating at friends' and family members' homes in both France and Switzerland but not in the Netherlands. Eating outside and in other places are both significantly negatively associated with eating meat in Switzerland but positive in both France and the Netherlands.

Turning to red meat consumption, the pattern of results is broadly similar. However, eating at work is not significantly differently associated with the likelihood of eating red meat compared to at home in France and eating outside is not significantly differently associated with the likelihood of eating red meat compared to at home in Switzerland. See Figure 3 for a coefficient plot and Appendix Tables A4 and A7 for the logit estimates from the multilevel regression analysis.

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*Differences across genders for meat and red meat consumption in the three countries*

When I examine interactions between the situational variables and gender, I find that gender moderates only some of the relationships between situational variables and meat consumption across the tree. For example, neither meal type does not significantly interact with gender to predict meat consumption in either France or Switzerland. In contrast, in the Netherlands, it does appear that men as compared to women are more likely to have meat at breakfast than at several other times of day. Men are more likely to eat meat on Friday compared to Monday relative to women in Switzerland and more likely on Tuesday and Wednesday than women in the Netherlands but most of the interactions between days of the week and gender are insignificant. Additionally, all but one of the interactions between gender and location are insignificant: men are relatively more likely than women to eat meat at work in the Netherlands.

There is similarly little evidence of significant interactions between situational variables and gender in predicting red meat consumption. See Appendix Tables A9–A11. However, there is some additional evidence that in Switzerland men are more likely compared to women to eat red meat at friends' and family members' homes and other places than at home. In contrast, men are relatively less likely to eat red meat at friends' and family members' homes in the Netherlands. See Appendix Tables A9–A11.

## Discussion

In the current work, I present the first cross-cultural comparison of the situational predictors of meat and red meat consumption using national nutrition survey data for three Western European countries. In doing so, I highlight some key situational correlates of consumption in this domain, as well as providing a cross-cultural perspective. With the exception of Horgan *et al.* (2019) and Biermann and Rau (2020), who explore the situational correlates of meat consumption in the UK and Germany, respectively, there is a dearth of literature on this topic.

The analysis reflects the four 'ws' – when, where, what and who? In terms of 'when', the results highlight both lunch and dinner as being the meals during the day when both meat and red meat are most likely to be consumed, with lunch being the most likely in France, dinner the most likely in the Netherlands and lunch and dinner equally likely in Switzerland for both outcomes. These results are robust to including day of the week and location controls (See Appendix Table A8), suggesting that lunch and dinner are important predictors in all places irrespective of where and on what day people are having these meals. In contrast, snacks vary in terms of whether they are more or less likely to involve meat and red meat across countries. A further 'when' variable – the day of the week – is largely unrelated to the likelihood of eating meat and red meat, except in the case of Switzerland where meat and red meat are more likely to be eaten on Sundays. This latter result is similar to the 'Sunday effect' documented by Horgan *et al.* (2019) in the UK. In the full specification of the model in Appendix Table A8, I present an analysis of the day of the week controlling for where a person is and what meal type is

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involved. That the Sunday finding remains suggests that there may be customs around Sunday roasts or other meat-based meals that involve meat irrespective of where and what time of day a meal is taking place.

Turning to the second 'w' variable – where – we see that restaurants and cafés are highlighted as important sites where people tend to eat meat in all three of the case study countries. This finding may be explained by restaurants and cafés presenting enticing meat options for people and/or people seeing eating out as occasion on which to treat themselves to meat (Biermann and Rau, 2020; Onwezen, 2023). The results also indicate that eating at friends' and family members' homes is positively associated with eating meat in Switzerland and France but not so in the Netherlands. These results echo findings from qualitative work that examined instances of vegetarians eating meat which report that this typically occurs at family gatherings and on social occasions (Rosenfeld and Tomiyama, 2019) and other work that highlights that intention-behaviour gaps among meat reducers are more likely to emerge when at friends' and family member's homes (Laffan *et al.*, 2023). These settings might be particularly predictive of red meat consumption given some evidence to suggest that norms around providing shared meals at social gatherings are meat-centric (Biermann and Rau, 2020). Finally, the results indicate that meat and red meat are less likely to be eaten at work compared to at home in both the Netherlands and Switzerland, and meat but not red meat is less likely in France. These findings echo those of Laffan and colleagues (2023) who find that meat reducers are less likely to eat meat in situations where work needs to be done. One possible explanation for this is the strong hedonic associations many make with meat (Graça *et al.*, 2015) make it more appealing in situations that call for treats as opposed to work. Importantly, in the Netherlands, the impact of eating at work compared to at home controlling for day of the week is positive. This reversal highlights the difference between examining the simple relationships between a given situational factor and meat and red meat eating, and the partial relationship controlling for other situational factors.

The third and fourth 'w' variables 'what' and 'who' are examined in the sense that the analysis models both meat consumption in general and red meat consumption in particular and examines interactions between situational variables and gender. The main findings are largely consistent across meat and red meat consumption. Despite its more intensive environmental and health impacts, red meat is not consumed in systematically different ways from other forms of meat in the countries under consideration. Finally, I find that men have a higher overall propensity to consume meat compared to women in all three countries, echoing findings in other samples from the case study countries (Rousset *et al.*, 2005; van Rossum *et al.*, 2011; Marques-Vidal *et al.*, 2015). Additionally, the importance of some of the contextual predictors varies across gender. For example, in the Netherlands, men are more likely to eat meat at work than when at home, whereas women are less likely. One potential explanation for this is the greater level of visibility of the consumption choices outside of the home and the associations between meat consumption and masculinity that many in Dutch society report making (Schösler *et al.*, 2015). In other work, Pachucki and colleagues (2018) find that diet quality in a sample of patients with type 2 diabetes varies depending on meal location patterns, with men eating better at home and women outside the home. While overall the analysis does not flag

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extensive interactions between gender and situational factors, the significant results that do emerge indicate it is still an important lens to examine when thinking about encouraging reductions in meat consumption by these specific population groups.

Taken together, the results indicate that meal type and location and to a lesser extent day of the week are important situational correlates of meat consumption that are worth inquiring into to better understand and shape people's choices. Additionally, these results indicate that even within countries that are in close geographical proximity to one another, the situational correlates of meat consumption differ, suggesting cultural influences are at play.

The current work has several strengths, including its use of large nationally representative samples across three different countries and its exploration of the scientific and policy-relevant question of the relationship between contextual correlates and meat consumption. At the same time, the work is not without limitations. First, the available data do not allow me to investigate other features of context that research suggests are linked to meat consumption, including who the person is with at the moment of consumption and more detailed features of their environment such as the food options available to them and whether the person is engaged in other activities (Tanner and Wölfing Kast, 2003; Hetherington *et al.*, 2006; De Castro, 2009). Additionally, as the datasets are aimed at understanding population nutrition trends, they do not include individual specific factors, such as self-control, meat attachment or habit strength (Graça *et al.*, 2015; Loy *et al.*, 2016; Nielsen and Hofmann, 2021), which may moderate the relationship between situational factors and consumption (Stoll-Kleemann and Schmidt, 2017). Future work using other data sources should look to explore these factors. Additionally, data allowing, the current work could be extended to examine other relevant 'w' factors like seasonal patterns, holidays and festivals (when) and heterogeneity analyses (who) which could, for example, investigate differences across ethnic groups (Choi and Lee, 2022) or immigrant status (Lesser *et al.*, 2014).

Second, in focusing on consumption in the three Western European countries spanning between the years 2012 and 2016, the work cannot speak to the relative importance of the contextual factors explored here in other parts of the world or the case study countries in more recent times. Although the average diets in all three countries are characterised by high levels of meat consumption, there are other countries with higher per capita meat consumption, as well as in some cases much larger populations such as North America, Australia and Argentina (Our World in Data, 2020) – these places should be the focus of future work. Additionally, as new dietary datasets are released similar exercises should be carried out to investigate whether the situational predictors of meat and red meat consumption have changed over time. This is of particular importance given evidence suggests that per capita meat consumption has increased somewhat in all three countries in subsequent years (Our World in Data, 2020).

Based on the results, policymakers from each of the three case study countries can better understand the contexts to target when to develop and deliver interventions to reduce meat consumption. For example, across all three countries, meat is more likely to be eaten when eating at a restaurant or café. This finding highlights this location as

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a place that interventions and campaigns could address, for example, with situated interventions like menu design changes such as carbon labelling (Brunner *et al.*, 2018) or composition changes (Parkin and Attwood, 2022). It also highlights social gatherings as another key situation in France and Switzerland when meat and red meat are likely to be consumed. Interventions that aim to encourage sustainable dietary choices in this sphere could look to influence norms around these gatherings, for example via social marketing approaches (Bogueva *et al.*, 2017). Additionally, the situational predictors of both meat and red meat consumption vary across the three countries under consideration, indicating that context-specific behavioural mapping exercises in each country and region where interventions are being developed are an important first step in situated behavioural intervention design. Finally, the evidence for differences across genders suggests that if a particular gender is the target of an intervention – e.g., men who tend to display higher levels of meat consumption and attachment (Rosenfeld and Tomiyama, 2021) – then those behind the strategy should consider targeting some contexts (like work for men) that they otherwise would not.

More generally, the current work emphasises the value of examining situational factors (as encapsulated by the 'w' framework) to behavioural intervention efforts. Within the behavioural science literature, increasing emphasis is being placed on understanding context and its influence on the effectiveness of behavioural interventions (Bryan *et al.*, 2021; Nielsen *et al.*, 2021; Szaszi *et al.*, 2022). Behavioural mapping efforts like the one presented here that focus on those behaviours that are important to change from a policy perspective (*what*), and consider *when* and *where* they take place and how these patterns vary across socio-demographic groups (*who*) provide insights that can help design and target behavioural interventions. Understanding the relative importance of these different factors can also help to shape intervention strategies. For example, if time or day of the week variables are identified as important predictors then the timing of interventions should receive particular attention. On the other hand, if the location is a much stronger predictor then efforts to design interventions which work in those locations in which the behaviours are heavily concentrated will take precedence.

Additionally, by highlighting the variability of consumption across situations this kind of work emphasises the pressing need for intervention research to examine the generalisability of interventions from one situation to another (Bryan *et al.*, 2021), a key component of external validity (List, 2020).

In sum, food is an area of consumption in which the decisions people make throughout their day have a lasting impact on both their personal health and that of the environment. Meat and red meat are food types that are particularly important given the threats that overconsumption poses. The current work offers a richer understanding of patterns of consumption of these goods in daily life in France, Switzerland and the Netherlands than has been available to date, emphasising the links between when and where a food consumption occasion takes place and whether a person eats meat or red meat. This information should be taken into account by those looking to encourage reductions in meat consumption, helping them to focus their efforts on those contexts that really count.

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## References

Askegaard, S. and T. K. Madsen (1998), 'The local and the global: exploring traits of homogeneity and heterogeneity in European food cultures', *International Business Review*, **7**(6): 549–568.

Bates, D. M. (2010), *lme4: Mixed-Effects Modelling with R*. Springer. Available online at: http://lme4.r-forge.r-project.org/lMMwR/lrgprt.pdf

Benjamini, Y. and Y. Hochberg (1995), 'Controlling the false discovery rate: a practical and powerful approach to multiple testing', *Journal of the Royal Statistical Society: Series B (Methodological)*, **57**(1): 289–300.

Biermann, G. and H. Rau (2020), 'The meaning of meat: (un) sustainable eating practices at home and out of home', *Appetite*, **153**: 104730.

Bogueva, D., D. Marinova and T. Raphaely (2017), 'Reducing meat consumption: the case for social marketing', *Asia Pacific Journal of Marketing and Logistics*, **29**(3): 477–500.

Bouwman, E. P., M. J. Reinders, J. Galama and M. C. Verain (2022), 'Context matters: self-regulation of healthy eating at different eating occasions', *Applied Psychology: Health and Well-Being*, **14**(1): 140–157.

Brunner, F., V. Kurz, D. Bryngelsson and F. Hedenus (2018), 'Carbon label at a university restaurant–label implementation and evaluation', *Ecological Economics*, **146**: 658–667.

Bryan, C. J., E. Tipton and D. S. Yeager (2021), 'Behavioural science is unlikely to change the world without a heterogeneity revolution', *Nature Human Behaviour*, **5**(8): 8. https://doi.org/10.1038/s41562-021-01143-3.

Chatelan, A., S. Beer-Borst, A. Randriamiharisoa, J. Pasquier, J. M. Blanco, S. Siegenthaler, F. Paccaud, N. Slimani, G. Nicolas and E. Camenzind-Frey (2017), 'Major differences in diet across three linguistic regions of Switzerland: results from the first national nutrition survey menuCH', *Nutrients*, **9**(11): 1163.

Choi, S. E. and K. J. Lee (2022), 'Ethnic differences in attitudes, beliefs, and patterns of meat consumption among American young women meat eaters', *Nutrition Research and Practice*, **17**(1): 73–90.

de Boer, J. and H. Aiking (2018), 'Prospects for pro-environmental protein consumption in Europe: cultural, culinary, economic and psychological factors', *Appetite*, **121**: 29–40.

de Castro, J. M. (2004a), 'Dietary energy density is associated with increased intake in free-living humans', *The Journal of Nutrition*, **134**(2): 335–341.

de Castro, J. M. (2004b), 'The time of day of food intake influences overall intake in humans', *The Journal of Nutrition*, **134**(1): 104–111.

De Castro, J. M. (2007), 'The time of day and the proportions of macronutrients eaten are related to total daily food intake', *British Journal of Nutrition*, **98**(5): 1077–1083.

De Castro, J. M. (2009), 'When, how much and what foods are eaten are related to total daily food intake', *British Journal of Nutrition*, **102**(8): 1228–1237.

de Castro, J. M., F. Bellisle, G. I. J. Feunekes, A.-M. Dalix and C. De Graaf (1997), 'Culture and meal patterns: a comparison of the food intake of free-living American, Dutch, and French students', *Nutrition Research*, **17**(5): 807–829. https://doi.org/10.1016/S0271-5317(97)00050-X.

Dubuisson, C., A. Dufour, S. Carrillo, P. Drouillet-Pinard, S. Havard and J.-L. Volatier (2019), 'The Third French individual and national food consumption (INCA3) Survey 2014–2015: method, design and participation rate in the framework of a European harmonization process', *Public Health Nutrition*, **22**(4): 584–600.

Garnett, E. E., A. Balmford, C. Sandbrook, M. A. Pilling and T. M. Marteau (2019), 'Impact of increasing vegetarian availability on meal selection and sales in cafeterias', *Proceedings of the National Academy of Sciences*, **116**(42): 20923–20929.

Godfray, H. C. J., P. Aveyard, T. Garnett, J. W. Hall, T. J. Key, J. Lorimer, R. T. Pierrehumbert, P. Scarborough, M. Springmann and S. A. Jebb (2018), 'Meat consumption, health, and the environment', *Science*, **361** (6399): eaam5324.

Graça, J., M. M. Calheiros and A. Oliveira (2015), 'Attached to meat? (Un) willingness and intentions to adopt a more plant-based diet', *Appetite*, **95**: 113–125.

Harguess, J. M., N. C. Crespo and M. Y. Hong (2020), 'Strategies to reduce meat consumption: a systematic literature review of experimental studies', *Appetite*, **144**: 104478.

Hayley, A., L. Zinkiewicz and K. Hardiman (2015), 'Values, attitudes, and frequency of meat consumption. Predicting meat-reduced diet in Australians', *Appetite*, **84**: 98–106.

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Heisig, J. P. and M. Schaeffer (2019), 'Why you should always include a random slope for the lower-level variable involved in a cross-level interaction', *European Sociological Review*, **35**(2): 258–279.
Hetherington, M. M., A. S. Anderson, G. N. Norton and L. Newson (2006), 'Situational effects on meal intake: a comparison of eating alone and eating with others', *Physiology & Behavior*, **88**(4–5): 498–505.
Horgan, G. W., A. Scalco, T. Craig, S. Whybrow and J. I. Macdiarmid (2019), 'Social, temporal and situational influences on meat consumption in the UK population', *Appetite*, **138**: 1–9.
Laffan, K., L. K. Lades and L. Delaney (2023), 'Paths that lead astray: examining the situational predictors of intention-behaviour gaps in meat consumption', *Journal of Environmental Psychology*, **89**: 102045.
Lesser, I. A., D. Gasevic and S. A. Lear (2014), 'The association between acculturation and dietary patterns of South Asian immigrants', *PloS One*, **9**(2): e88495.
List, J. A. (2020), *Non est Disputandum de Generalizability? A Glimpse Into the External Validity Trial*. National Bureau of Economic Research.
Loy, L. S., F. Wieber, P. M. Gollwitzer and G. Oettingen (2016), 'Supporting sustainable food consumption: mental contrasting with implementation intentions (MCII) aligns intentions and behavior', *Frontiers in Psychology*, **7**: 607.
Marques-Vidal, P., G. Waeber, P. Vollenweider, M. Bochud, S. Stringhini and I. Guessous (2015), 'Sociodemographic and behavioural determinants of a healthy diet in Switzerland', *Annals of Nutrition and Metabolism*, **67**(2): 87–95.
Nielsen, K. S. and W. Hofmann (2021), 'Motivating sustainability through morality: a daily diary study on the link between moral self-control and clothing consumption', *Journal of Environmental Psychology*, **73**: 101551.
Nielsen, K. S., V. Cologna, F. Lange, C. Brick and P. C. Stern (2021), 'The case for impact-focused environmental psychology', *Journal of Environmental Psychology*, **74**. https://doi.org/10.31234/osf.io/w39c5.
Onwezen, M. C. (2023), 'Goal-framing theory for sustainable food behaviour: the added value of a moral goal frame across different contexts', *Food Quality and Preference*, **105**: 104758.
Pachucki, M. C., A. J. Karter, N. E. Adler, H. H. Moffet, E. M. Warton, D. Schillinger, B. H. O'Connell and B. Laraia (2018), 'Eating with others and meal location are differentially associated with nutrient intake by sex: the diabetes study of Northern California (DISTANCE)', *Appetite*, **127**: 203–213.
Parkin, B. L. and S. Attwood (2022), 'Menu design approaches to promote sustainable vegetarian food choices when dining out', *Journal of Environmental Psychology*, **79**: 101721.
Poore, J. and T. Nemecek (2018), 'Reducing food's environmental impacts through producers and consumers', *Science*, **360**(6392): 987–992.
Prättälä, R., L. Paalanen, D. Grinberga, V. Helasoja, A. Kasmel and J. Petkeviciene (2007), 'Gender differences in the consumption of meat, fruit and vegetables are similar in Finland and the Baltic countries', *European Journal of Public Health*, **17**(5): 520–525.
Ritchie, H. and P. Rosado (2023), 'Agricultural Production'. Data adapted from Food and Agriculture Organization of the United Nations. Retrieved from https://ourworldindata.org/grapher/daily-meat-consumption-per-person [online resource]
Rosenfeld, D. L. and A. J. Tomiyama (2019), 'When vegetarians eat meat: why vegetarians violate their diets and how they feel about doing so', *Appetite*, **143**: 104417.
Rosenfeld, D. L. and A. J. Tomiyama (2021), 'Gender differences in meat consumption and openness to vegetarianism', *Appetite*, **166**: 105475.
Rousset, S., P. P. Mirand, M. Brandolini, J.-F. Martin and Y. Boirie (2003), 'Daily protein intakes and eating patterns in young and elderly French', *British Journal of Nutrition*, **90**(6): 1107–1115. https://doi.org/10.1079/BJN20031004.
Rousset, S., V. Deiss, E. Juillard, P. Schlich and S. Droit-Volet (2005), 'Emotions generated by meat and other food products in women', *British Journal of Nutrition*, **94**(4): 609–619.
Rozin, P. (2005), 'The meaning of food in our lives: a cross-cultural perspective on eating and well-being', *Journal of Nutrition Education and Behavior*, **37**: S107–S112. https://doi.org/10.1016/S1499-4046(06)60209-1.
Saucier, G., T. Bel-Bahar and C. Fernandez (2007), 'What modifies the expression of personality tendencies? Defining basic domains of situation variables', *Journal of Personality*, **75**(3): 479–504.
Schösler, H., J. de Boer, J. J. Boersema and H. Aiking (2015), 'Meat and masculinity among young Chinese, Turkish and Dutch adults in the Netherlands', *Appetite*, **89**: 152–159.
Stern, P. C. (2011), 'Contributions of psychology to limiting climate change', *American Psychologist*, **66**(4): 303.

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Stern, P. C. (2020), 'A reexamination on how behavioral interventions can promote household action to limit climate change', *Nature Communications*, **11**(1): 918. https://doi.org/10.1038/s41467-020-14653-x.

Stoll-Kleemann, S. and U. J. Schmidt (2017), 'Reducing meat consumption in developed and transition countries to counter climate change and biodiversity loss: a review of influence factors', *Regional Environmental Change*, **17**: 1261–1277.

Szaszi, B., A. Higney, A. Charlton, A. Gelman, I. Ziano, B. Aczel, D. G. Goldstein, D. S. Yeager and E. Tipton (2022), 'No reason to expect large and consistent effects of nudge interventions', *Proceedings of the National Academy of Sciences*, **119**(31): e2200732119.

Tanner, C. and S. Wölfing Kast (2003), 'Promoting sustainable consumption: determinants of green purchases by Swiss consumers', *Psychology & Marketing*, **20**(10): 883–902.

van Rossum, C. T., H. P. Fransen, J. Verkaik-Kloosterman, E. J. Buurma-Rethans and M. C. Ocké (2011), *The diet of the Dutch: Results of the Dutch National Food Consumption Survey 2012–2016. 350050006/2011*. Available online at: https://www.rivm.nl/bibliotheek/rapporten/350050006.pdf

Van Rossum, C. T. M., E. J. M. Buurma-Rethans, C. S. Dinnissen, M. H. Beukers, H. A. M. Brants and M. C. Ocké (2020), The Diet of the Dutch: Results of the Dutch National Food Consumption Survey 2012–2016.

Verain, M. C., E. P. Bouwman, J. Galama and M. J. Reinders (2022), 'Healthy eating strategies: individually different or context-dependent?', *Appetite*, **168**: 105759.

Weingarten, N., M. Meraner, L. Bach and M. Hartmann (2022), 'Can information influence meat consumption behaviour? An experimental field study in the university canteen', *Food Quality and Preference*, **97**: 104498.

Willett, W., J. Rockström, B. Loken, M. Springmann, T. Lang, S. Vermeulen, T. Garnett, D. Tilman, F. DeClerck and A. Wood (2019), 'Food in the anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems', *The Lancet*, **393**(10170): 447–492.

Wolstenholme, E., V. Carfora, P. Catellani, W. Poortinga and L. Whitmarsh (2021), 'Explaining intention to reduce red and processed meat in the UK and Italy using the theory of planned behaviour, meat-eater identity, and the transtheoretical model', *Appetite*, **166**: 105467.

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