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Towards more sustainable dietary choices

Strategies for change in the context of Lucerne, Switzerland

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Abstract

Switzerland's current food system is unsustainable and responsible for 25% of the country's environmental footprint. Half of the greenhouse gas emissions from the Swiss food system are caused by meat and dairy consumption. Reducing Switzerland's GHG emissions from the food system requires an orchestrated approach, targeting amended consumption and production patterns. A primary change required is a significant reduction in meat consumption, which would lead to a decreased number of livestock and reduce the need for imported animal feed, as well as lower methane and ammonia emissions. The majority of meat is consumed in out-of-home settings, making the gastronomy sector an interesting area to target current consumer behaviour in a Swiss context. Previous research found that intervention strategies at restaurants could reduce GHG emissions from food choices through reduced meat intake. This study applies a mixed methods exploratory sequential research design. The local effects of a social norms statement intervention were tested in a restaurant in Lucerne with further insights gained through an online survey, expert interviews and literature review. This study concludes that concerted efforts targeting amended consumption and production patterns can achieve the largest reduction in emission levels from the Swiss food system, and dietary choices are the link between consumption and production patterns in the food system. Additionally, aligning health, agricultural and environmental policies is important and yields mutual benefits. Earlier studies show that the majority of the Swiss population is motivated to behave in a more environmentally friendly manner. As such, knowledge about effective measures and the availability of more environmentally friendly food options in out-of-home settings ought to be prioritised to further benefit from an environmentally friendly mindset. The focus of the effort should first lie on the 75-85% of meat eaters who have already reduced their meat intake. Increasing the availability of meat-free options and improving knowledge about the environmental effects of different food choices are important steps towards more sustainable dietary patterns in Switzerland.

Keywords: consumer behaviour, food system, dietary choices, meat intake

Executive Summary

Problem Definition

Agriculture is a significant cause of global environmental change and has profound effects on planetary boundaries and thus on the stability of the Earth system. In Switzerland, the current food system – all actors from producers via distributors to consumers – is responsible for 25% of the country's environmental footprint. Meat and dairy consumption alone account for approximately half of the GHG emissions of the Swiss food system. The largest result in lowering emission levels from the Swiss food system can be achieved through combined efforts targeting amended consumption and production patterns. Dietary choices which link agricultural production with consumption and the negative environmental impact of the Swiss diet could be reduced by half, primarily through a significant reduction in meat consumption. Gastronomy is an interesting sector to target current consumer behaviour, as it is one of the nodes of the food network where dietary choices of consumers meet product supply. In Switzerland, the majority of red meat is consumed in out-of-home settings and interventions in restaurants carry the potential to reduce GHG emissions from food choices through reduced meat intake. As Switzerland aims to reduce its GHG emissions from agricultural activities by at least 40% compared to 1990 until 2050, appropriate strategies and the corresponding catalysts need to be identified in order to execute, support and achieve this goal.

Aim and Research Questions

Over 50% of Swiss citizens are willing to change their behaviour for the environment. However, knowledge is lacking when it comes to the environmental impacts of specific product choices - dairy and meat consumption levels remain high. Reducing meat has been considered to carry the least environmental benefits whereas avoiding excessive food packaging the highest – however previous studies found the opposite to be true. Nevertheless, solely being aware that a certain behaviour is better than another does not necessarily lead to more environmentally friendly behaviour. In addition to personal factors, socio-cultural and external factors are relevant in the context of meat consumption. Further research is needed to identify effective interventions targeting these three factors to ultimately reduce meat consumption.

Current local policies focus on increasing awareness and providing information, but other interventions including those targeting social norms could also be utilized. Real-life evidence is currently missing for the case of Lucerne to assess the effectiveness of nudges which target social norms. This thesis aims to assess the effect of a social norm message on actual consumer behaviour in a restaurant in Lucerne and aims to identify how local catalysts can support a change in behaviour. As such the following research questions were identified:

> **RQ1:** How can local catalysts support a change in consumer behaviour to curb meat intake in out-of-home settings in Lucerne?
>
> **RQ2:** How does a social norm message influence actual consumer behaviour in a restaurant in Lucerne?

Research Design, Materials and Methods

This thesis uses a mixed methods design, which involves the collection of both qualitative and quantitative data. The exploratory sequential design, a three-phase design, was utilized to gain a general understanding of the Swiss food system and the current efforts in the region of Lucerne to improve its environmental sustainability. Phase 1 contained a literature review and the collection of expert input concerning activities in the local gastronomy sector which target reduced meat consumption. The results from Phase 1 helped to generate an overview of the

local actors with immediate impact on consumer behaviour and provide a basis to answer RQ1. Furthermore, the insights gained from Phase 1 served as the foundation for the research design in Phase 2.

Phase 2 involved testing a social norm statement intervention strategy in a restaurant in the city of Lucerne. The experiment, which was conducted from February to early March 2023, generated quantitative data. The results from Phase 2 lay the groundwork for Phase 3, which serves as the prerequisite to answer RQ2. The data for evaluation of Phase 3 includes the sales data from the baseline period as well as the intervention experiment and the responses gathered through an online survey made available to restaurant customers during the experimentation phase. Phase 3 is the prerequisite for the last step of the research design – the interpretation of results.

Results

Lucerne's current climate policy aims to reduce consumption related emission from the food system through a balanced diet and by reducing emissions from production. Emissions from the food system are mentioned but no clear reduction goals are defined, and their significance is not indicated. Given the intense local agricultural activities and the Swiss cultural identity food system changes are a delicate topic. The climate and energy strategy of the city of Lucerne addresses health issues related to nutrition solely once and only in connection to educational aspects at schools. The connection to air emissions and health is much more prominently indicated. As such a lack of orchestration of environmental, agricultural and health policies can be observed. No current initiative specifically targeting restaurants to help change consumer behaviour was known to be driven by the local authorities. Food waste measures are mentioned by governmental and gastronomical institutions as a way to reduce direct and indirect emissions from the food system.

The results of the experiment show that a social norm statement, with a social reference group (the fellow population of the city of Lucerne), in a normative communication style does not necessarily motivate people to choose a meat-free option. During the baseline period from January 30th to February 26th, 2023, a total of 726 orders were taken during the lunch services from Mondays to Fridays. During the intervention period from February 27th to March 10th, 2023, a total of 450 orders were taken during the lunch service form Mondays to Fridays. During the intervention, 257 orders were made from customers who received the standard menu, and 193 orders were made from customers who received a menu containing a social norm statement. There is not enough evidence to conclude that the intervention menu had a statistically significant impact on the lunch orders - the intervention menu had a non-significant impact on the order pattern during the lunch service during the entire period. Nevertheless, the results show that the availability of a meat-free option itself already lead to more than 40% of all orders to be vegetarian or vegan - irrespective of intervention or baseline. Consequently, identifying what is required to maintain a high level of vegetarian orders is crucial.

During the intervention period 45 customers completed the online survey, which translates to a response rate of 10%. 21 female and 24 male customers participated in the survey. The results show a high confidence level about the knowledge of how meat impacts the environment among the respondents. However, the environmental effects of animal products are being clearly underestimated by the Swiss population. The results from the online survey show that 40 respondents agree or fully agree to be mindful to behave in an environmentally conscious manner in daily life. The results show a high willingness to behave in an environmentally friendly manner. Gender has been previously found to play a significant role in meat intake decisions and overall women eat much less meat compared to men in Switzerland. The findings could be

reconfirmed through the online survey results. From the total of 24 male participants only 4 choose a meat-free option. From a total of 21 female respondents, 12 choose a meat-free option.

Recommendations and Conclusions

The current local policy states that information provision and knowledge are the primary tools used to shift consumer behaviour towards more sustainable choices – including reduced meat consumption. However, the currently applied interventions do not seem to yield the desired results in terms of changed consumer behaviour and thus further policy interventions are required to synergistically curb GHG emissions from the Swiss food system. Approximately 90% of the Swiss eat meat and the consumers are not necessarily in the position to assess the environmental impacts of different food choices correctly. As such, there is room for improvement to better educate the population and strengthen information and knowledge provision measures, which are widely accepted interventions. There is great potential as the majority of the population would like to behave in an environmentally friendly way. Thus, the focus of efforts should first lie on the 75 to 85% of meat eaters who would consider or have already reduced their meat intake. An increase in the availability of meat-free options and improved knowledge about the environmental effects of different food choices, together with the willingness to take healthy and environmentally friendly food choices provides hope for change.

An orchestrated policy mix including agricultural, health and environmental aspects is suggested to transform the Swiss food system. Actions need to be taken from all actors within the system to help individual consumers develop new social norms where reduced meat intake is normalised. Public health professionals, the city council and policy makers as well as the gastronomical and tourism sector should adopt a more proactive and supportive approach to help consumers follow healthier and more environmentally friendly diets. The city council of Lucerne should actively contribute to improved decision-making in the context of reduced meat consumption, while still upholding the principles of libertarian paternalism. Although, the Swiss cow is a symbol of cultural heritage and Swiss traditions, which some organisations and individuals want to protect, reducing meat intake helps Switzerland's food system to become healthier and more environmentally friendly. Moreover, a reduction in meat consumption would allow the Swiss food system to be more self-sufficient, relying less on food imports and thus become more resilient towards external shocks.

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Abbreviations

BMI	Body Mass Index
CHF	Swiss Francs
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
GHG	Greenhouse Gas
PM	Processed Meat

1 Introduction

The stability of the Earth system is essential for the development of human societies. The framework of the planetary boundaries defines a safe operating space for humanity to ensure the system's stability (Steffen et al., 2015). Agricultural activities have a profound effect on planetary boundaries. On a global scale, agriculture is the single most impactful cause of environmental change (Willett et al., 2019) with land-system change, freshwater use, biosphere integrity, nitrogen flows and climate change being particularly affected by agricultural activities (Campbell et al., 2017; Foley et al., 2011; Gerten et al., 2020).

Food is produced, processed, prepared, distributed, and finally consumed, making up the elements of a food system (Willett et al., 2019). Looking at the local context of Switzerland, the current food system is not sustainable and the associated impacts from food consumption and production are responsible for 25% of the country's environmental footprint (Fesenfeld et al., 2023; Swiss Federal Council, 2022). The lion share of the environmental impacts – two thirds – caused by the Swiss food system occur abroad (Swiss Federal Council, 2022). Meat and dairy consumption alone are responsible for approximately half of the GHG emissions of the Swiss food system (Ernstoff et al., 2020; FOEN, 2018). To support the stability of the Earth system, Switzerland aims to reduce its greenhouse gas emissions from agricultural activities by at least 40% compared to 1990 by 2050. However, since the 2000's, the emission levels of the Swiss food system are stagnant (Der Bundesrat, 2021).

To alter food systems, improvements need to be realized from all actors in the food system and include improvements in production, distribution and changes in demand in the form of alternative diets (Foley et al., 2011; Willett et al., 2019). Similar findings and recommendations have been developed for Switzerland, indicating the need of an orchestrated approach where both production systems and altered diets are considered (Stolze et al., 2019). It was found that the largest reduction emission levels from the Swiss food system can be achieved through combined efforts targeting amended consumption and production patterns (Der Bundesrat, 2021; Frehner et al., 2022). The link between consumption and production patterns in the food system is made through dietary choices (Willett et al., 2019). The negative environmental impact of the Swiss diet could be cut in half through a significant reduction in meat consumption which would lead to a decreased number of livestock and thereby reducing the need for imported animal feed as well as lower methane and ammonia emissions (Zimmermann et al., 2017).

1.1 Problem Definition

Our lifestyles determine a significant amount of global GHG emissions and over three quarters of the total lifestyle carbon footprints can be attributed to housing, personal transport and food (Akenji et al., 2021). As annual incomes have increased so has the demand for meat protein (Tilman & Clark, 2014). This also holds true for Switzerland, where the increased wealth level over the past years has led to unsustainable consumption patterns where more meat, dairy, coffee, fish, chocolate or exotic fruit is consumed (FOEN, 2018). This consumption pattern means that in Switzerland red meat and dairy each accounted for 20% of the total GHG food footprint and with other meat including fish, another 15%, accumulating to about half of the GHG footprint of the average Swiss diet (Ernstoff et al., 2020). Jungbluth et al (2022) found a vegan diet to be the single most promising behaviour change to reduce the environmental impact of Swiss diets, followed by a reduction of food waste. Buying locally, seasonally or avoiding plastic bags showed significantly less emission reduction potential. Matasci et al. (2021) found that Swiss citizens can directly influence approximately half of the GHG emissions related to consumption. For food, the direct influence on GHG emissions through consumer behaviour was found to be significant. The authors estimate a direct consumer influence potential of approximately 80% in Switzerland. If everybody behaved like the most climate

friendly 20% of the population, GHG emissions under direct consumer influence would diminish by approximately 31% (Matasci et al., 2021).

So, where do the Swiss quench their hunger for meat? Approximately 5% of the Swiss household income is spent on meals in restaurants, bars, cafés, takeaways and canteens (Federal Statistical Office, 2022). Interestingly, the majority of meat is consumed in out-of-home settings (Ernstoff et al., 2020). Landert et al. (2021) found that in the city of Zürich over 60% of beef and half of all pork is sold through the gastrostomy sector. The next important players are retailers and lastly specialty shops or farmers markets. This makes the gastronomy an interesting sector to target and influence current consumer behaviour, as it is one of the nodes of the food system where dietary choices of consumers meet product supply. This thesis focuses on investigating options to change local consumption patterns in out-of-home settings in Lucerne. Better understanding the local context and its actors is primarily driven by the fact that Lucerne is the author's hometown. Previous research found that intervention strategies at restaurants carry the potential to reduce GHG emissions from food choices through reduced meat intake (Betz et al., 2022; Brunner et al., 2018; Kurz, 2018). Betz et al. (2022) found in their online survey a reduction of 13.5% in CO_2e when carbon labels were present on the menu. Brunner et al. (2018) observed a smaller impact in their field experiment in a Swedish student catering facility. They found that a label had an effect on consumer behaviour, but emissions decreased just by 3.6%, irrespective of gender or age. Kurz (2018) changed the menu order and improved visibility of the vegetarian option which led to increased sales of the non-meat option at a Swedish University. The calculated GHG emission reduction through this intervention approach resulted in approximately 5% emission reduction from the food served. As such, GHG emissions from food systems are immensely driven by dietary choices and changes towards diets with fewer animal products could yield significant GHG reductions and hence support the stability of the earth system (Willett et al., 2019).

1.1.1 Local Initiatives

Integrating economic, transportation, financial, agricultural, spatial planning, energy, and health policies with environmental concerns is considered to be an increasingly important strategic priority by the Swiss government. More plant based diets are considered to be both good for human health and the environment (Swiss Federal Council, 2022). However, there is currently room for improvement. For example, the dietary recommendation from the Swiss government is predominantly concerned with health aspects and is not rooted in a more holistic sustainability context with inconsistency existing between the dietary guidelines and the government's sustainability goals inspired by the Paris Agreement and the SDGs (Teschner et al., 2021).

The local Climate and Energy policy of the canton of Lucerne identifies three main areas where action is required in the local agricultural practices: a) low emission production technologies, b) low emissions productions structure and c) climate friendly food consumption. The policy acknowledges the need to reduce the number of livestock through less demand which is beneficial to reduce emissions and from a public health perspective (Kanton Luzern, 2021). The currently applied policy measure to promote climate friendly food consumption is primarily based on information and communication provision.

In the city of Lucerne the public initiative "Nachhaltige und faire Ernährung" (Translated by the author: sustainable and fair food) was submitted to the city council in 2016 (Stadt Luzern, 2018). The initiative aimed at educating the city's population concerning the environmental, health and animal welfare impacts of food consumption. Moreover, the committee targeted the competencies of the city considering their ability to influence the menu offerings of publicly owned or led food establishments to offer at least one vegan menu per day. The initiative aimed at amending the regulation for the city's sustainable energy, clean air and climate policy. A

counterproposal of the initiative was accepted by the city council. The city government's response to the 2016 initiative, indicated that regulations for the promotion of a specific diet would be perceived as paternalism by the people und hence unlikely to be accepted. The change has been effective since June 1st, 2018, and includes that the city of Luzern contributes to the reduction of grey energy (otherwise referred to as Scope 3 emissions) from food and the consumption of further goods and services. This is achieved especially through building activities and procurement as well as information and communication activities. Targeted initiatives in collaboration with restaurants or targeted campaigns to change consumer diets to curb meat consumption are not explicitly mentioned (Stadt Luzern, 2018).

1.1.2 Local Consumer Behaviour

The willingness of the Swiss population to contribute to the solution of environmental issues is generally high (Schwegler et al., 2015). However, the study by Schwegler et al. (2015) also found that the effectiveness of certain measures taken by individuals is sometimes misjudged. For example, the effectiveness of reducing meat consumption tends to be underestimated by the Swiss. Similarly, Kamm et al. (2015) found that there is awareness in the Swiss population, that reducing the frequency of meat consumption is positive for the environment. As such, eating ecologically sustainable is starting to form as a social norm. However, the study identified knowledge gaps in the Swiss population when it comes to implementation know-how – the majority could not correctly identify the seasonality of fruits and vegetables or estimate the environmental impact of specific products, such as meat. The lacking knowledge of the Swiss population has been confirmed in other studies when the Swiss estimated the environmental benefits of avoiding excess food packaging to be highest and reducing meat to be lowest – which is inherently wrong (Siegrist et al., 2015; Tobler et al., 2011).

However, knowing that a certain behaviour is better than another does not necessarily lead to more environmentally friendly behaviour (Jackson, 2005; Kollmuss & Agyeman, 2002). Knowledge and skills are part of the personal factors which influence meat-eating behaviour. Further factors which influence meat intake include socio-cultural factors such as culture or social norms and external factors including political and economic factors (Stoll-Kleemann & Schmidt, 2017). Kwasny et al. (2022) analysed the effectiveness of intervention strategies to reduce meat consumption and states that the drivers and barriers for meat reduction have been distilled by academic research. However, the insights into the effectiveness of interventions to change consumer behaviour concerning meat is insufficient. Furthermore, Kwasny et al. (2022) found that, interventions targeting socio-cultural factors such as norms are particularly scarce in evidence. It is suggested that more experimental research is needed which investigates actual meat consumption behaviour and not consumers' intentions to change or self-reported behaviour (Betz et al., 2022; Campbell-Arvai et al., 2014; Kwasny et al., 2022; Weibel et al., 2019).

Weibel et al. (2019) found attitude, personal norms, perceived behaviour control and problem awareness to have a significant impact on meat consumption behaviour in Lucerne. Emotions and social norm are seen to be particularly relevant to initiate behavioural change for people who have never considered reducing their meat intake or have considered to reduce their meat intake but have not yet put this plan fully into practice. The willingness of the Swiss to abstain from the consumption of meat for a day is common, however not eating meat five days a week is often considered infeasible (Kamm et al., 2015). The authors state that to establish a new social norm, small steps need to be taken so that the majority of the Swiss population support the new norm. Social norms have been identified to be a potential nudge to change consumer behaviour in Switzerland (Kamm et al., 2015; Schwegler et al., 2015; Weibel et al., 2019). Nudges are interventions which aim to alter the behaviour of people so that their lives become better, without eliminating options (Thaler & Sunstein, 2008). In addition to the use of social norms,

Lehner et al. (2016) identified three further nudge mechanisms which can be applied to influence food consumption behaviour, and these include: a) the simplification and framing of information, b) amendments to the default option, c) amendments to the physical environment. The authors state that nudges show considerable potential in laboratory experiments but real-life success of such nudging interventions in the food consumption sphere is scarce.

1.2 Aim and Research Questions

In summary the current food system is highly unsustainable and the stagnant progress in reducing negative environmental effects including GHG emissions from the local food system in Switzerland needs to be addressed through a holistic approach (Fesenfeld et al., 2023). The Swiss population is willing to contribute to the protection of the environment and more than 50% of the population would be willing to abandon certain behaviour if this proves beneficial for the environment (Schwegler et al., 2015). However, the current consumption levels of dairy and meat are not aligned with the country's environmental target (Der Bundesrat, 2021; Fesenfeld et al., 2023; Kamm et al., 2015; Swiss Federal Council, 2022). As outlined by multiple authors (Harguess et al., 2020; Kwasny et al., 2022; Lehner et al., 2016) further research is required to better understand what interventions are most suitable for a given context to lower meat intake. Lucerne's policies primarily focus on knowledge and information provision to consumers, expecting that higher awareness levels lead to changed behaviours. Other intervention proposals suggest making use of social norms. It is encouraging that the majority of the Swiss population is willing to change their behaviour for the benefit of the environment, however accompanying systemic change is required along the entire food system to have a significant impact. But what could be effective interventions to limit meat intake levels in the context of Lucerne and who would need to act? The following research questions were identified as being relevant:

> **RQ1:** How can local catalysts support a change in consumer behaviour to curb meat intake in out-of-home settings in Lucerne?
>
> **RQ2:** How does a social norm message influence actual consumer behaviour in a restaurant in Lucerne?

1.3 Scope and Delimitations

Lucerne, the author's hometown, is a picturesque city nestled on the shores of Lake Lucerne, surrounded by majestic mountains. As the capital of the canton of Lucerne, the city serves as a popular tourist destination. The primary focus of this thesis is to explore the possibilities of altering consumer behaviour regarding meat consumption within Lucerne, Switzerland. While this study examines the catalysts within the local food system, it does not encompass the production and distribution aspects - Figure 4-1 indicates the considered catalysts within the local food system. Additionally, the aim of this thesis is not to quantify the reduction potentials of GHG emission resulting from dietary changes, but rather to concentrate on strategies to transform consumer behaviour.

To answer the research questions, this thesis relies on a literature review, expert insights, local research output, and the findings of an experiment as well as an online survey at a middle-class restaurant in Lucerne. It was decided to test the intervention for 2 weeks in March 2023. Additionally, baseline sales information was gathered from the month prior to the intervention. This means that the baseline lasted from January 30th to February 26th. The intervention took place from February 27th to March 10th, 2023. During the entire study over 1000 meals orders were recorded during the lunch service and 45 customers completed the online survey.

A key assumption is that consumer behaviour in Zurich and Lucerne is comparable to one another, particularly the consumption of red meat in out-of-home settings. Appendix A – Lucerne and Zurich compared, provides an overview of the two cities and thus a justification for the assumption that the gastronomy sector in Lucerne is equally interesting to change consumer behaviour compared to Zurich.

1.4 Ethical Considerations

This research project is not supported or funded by a third party which would have the potential to influence the research or the conclusions thereof. No potential for the participants of the field experiment to suffer any disadvantage or damage was foreseen. Nevertheless, participants may be opposed to the idea that their choice was influenced by the intervention strategy which was tested. Chapter 3.4.4. further elaborates upon the reasoning why the chosen strategy of influencing the food choice of consumers is believed to be ethically just. The research design has been reviewed against the criteria for research requiring an ethics board review at Lund University and has been found to not require a statement from the ethics committee.

Participation in the online survey was voluntary and if requested customers were able to opt out. The answers of the survey were used for statistical purposes, further outlined in Chapter 2. Personal information in the form of an e-mail address for individuals who wished to participate in the raffle was gathered. To avoid third party access to the data, a password protected University server was used to store the survey responses and hence no one from the restaurant or their guests has had to possibility to view any responses. Sensitive information has been stored and managed so that it cannot damage the reputation of the gastronomy establishment, the customers or any of the employees. Consequently, the access to the data was solely possible through a private, password protected laptop to which only the author has had access to. Upon completion of the data analysis all data gathered through the survey was deleted from the online database. All data associated with the orders and online survey are going to be deleted upon completion of this study.

E-mail exchanges or meetings with local practitioners and experts were anonymised to respect privacy of the respondents. For the sake of consistency all respondents were treated equally in terms of privacy protection and anonymity, although not expressed by some. All communication and data were stored on a private, password protected laptop to which solely the author has had access to. All data will be deleted upon completion of this study.

1.5 Audience

The target audience of this thesis are individuals or groups involved in the policy making process, as well as gastronomical institutions, tourism associations or individual restaurants which are interested in measures which positively impact climate change. Furthermore, public health professionals and individual consumers may be interested in these findings as the two challenges of climate change and public health are closely connected through dietary choices.

1.6 Disposition

Chapter 1 provided an introduction to the issue and why it is important to further conduct research within the food system, focusing on consumers. The major sustainability issues were presented, and the relevant research questions were introduced. Chapter 2 outlines the chosen research design to answer the research questions. Three major phases are introduced, and the corresponding actions explained to ultimately answer the posed research questions. The structure of this thesis follows the three research phases. Chapter 3 offers an overview of the most important concepts to help better understand how consumers can be motivated to behave in an environmentally friendly way. Global and local research insights into meat consumption

and its drivers are analysed. Furthermore, the local context is being introduced together with local policies and the acceptance of specific interventions to change meat consumption. Chapter 4 first introduces an overview of the considered catalysts within the food system and continues with the findings from the literature review, the expert interviews as well as the intervention experiment and the online survey. Chapter 5 provides a discussion of the findings and their capacity to answer the initial research questions. Methodological and theoretical choices are discussed together with the limitations of this study. Lastly, Chapter 6 presents practical recommendations to the local catalysts to curb meat consumption, highlights the main conclusions of this thesis and introduces areas of interest for potential future research.

2 Research Design, Materials and Methods

2.1 Research Design

This thesis applies a mixed methods design - such a study design involves the collection of qualitative and quantitative data (Creswell & Creswell, 2018). When a mixed methods design is utilized, there are three primary designs which are typically applied: a) convergent design, a one phase design, b) explanatory sequential design, a two phase design, or c) exploratory sequential design, a three phase design (Creswell & Creswell, 2018, p. 300). This thesis applies an exploratory sequential design. Creswell & Creswell (2018) indicate that an exploratory sequential mixed methods design typically starts with a qualitative phase followed by a quantitative phase – as indicated in Figure 2-1. The two research forms – quantitative and qualitive research - are integrated in the design analysis for mixed methods research. Major strengths of applying a mixed methods research as defined by Creswell & Creswell (2018) which are applicable to this thesis are a) the minimization of the limitation of simply using qualitative or quantitative method and the ability to evaluate processes and outcomes of experimental intervention or policy decisions.

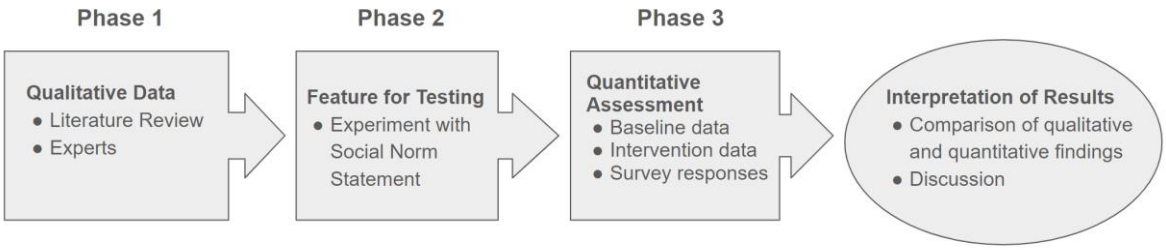

Figure 2-1 Exploratory Sequential Design

Source: Own illustration, based on Creswell & Creswell (2018)

Figure 2-1 illustrates the applied research process from left to right. In this case qualitative data from the literature review, grey literature in the form of policy papers and experts' inputs are used first to gain understanding of the local context – Phase 1. Based on the findings and insights from Phase 1, the experiment was designed, leading to Phase 2. The experiment tested the feature of a social normative statement on the menu of a restaurant in Lucerne during its lunch service for a period of two weeks in early 2023. The experiment generated quantitative data in the form of sales data and responses generated through an online survey – which are assessed in Phase 3. Creswell & Creswell (2018) suggest the mixed methods results are interpreted in the discussion section, which is shown by the circle to the very right of Figure 2-1 – interpretation of results. The activities per phase as shown in Figure 2-1, the materials collected and the corresponding analysis as well as limitations will now be explained in more detail.

2.2 Phase 1 – Status Quo of the local context

The goal of Phase 1 was to gain a general understanding of the Swiss food system and the current efforts in the region of Lucerne to improve the environmental sustainability of the system. The focus of the criteria concerned strategies aimed at consumer behaviour to reduce meat consumption. The two main sources included secondary data in the form of academic and grey literature and primary data from expert interviews.

The insights gained from Phase 1 served as the basis for Phase 2 of the research design. The results from Phase 1 helped to generate an overview of the local actors with immediate impact

on consumer behaviour and as the basis to answer RQ1 - How can local catalysts support a change in consumer behaviour to curb meat intake in out-of-home settings in Lucerne?

Literature Review

The literature review included both peer reviewed academic papers as well as grey literature in the form of local reports and policy papers. First, the review helped identify current problems within the Swiss food system and identify intervention opportunities to better the system from a consumer perspective.

The literature review helped analyse and identify research gaps and proposals for intervention testing to influence consumer behaviour in Lucerne. Local policy papers were analysed in terms of strategies to change the amount of meat consumed or policies aiming at changed consumer behaviour concerning meat or animal products. The findings were used to develop the experiment in Phase 2 in order to test an appropriate intervention strategy in the city of Lucerne.

Experts

Analysing the available literature helped identify local catalysts in the region of Lucerne. The objective was then to identify these local catalysts and map their current efforts targeting a change in consumer behaviour concerning meat intake in out-of-home settings. To achieve this objective, experts in the area were identified through previous research, published reports, policy papers or governmental and interest group websites. An overview of the interviewees can be found in Appendix M – List of consulted experts. The primary objective of the interviews was to ensure that the most up to date information concerning the different ongoing initiatives concerning meat intake reductions in the region of Lucerne was gathered. The interviews also helped in identifying other experts and a location to conduct the experiment in Phase 2.

2.2.1 Methods used to collect data

Literature Review

To understand the drivers for meat consumption and identify potential local intervention strategies, previous academic research was consulted. The search strings in Google scholar for the initial review of the literature concerning the status quo of the Swiss food system included sustainable AND Food System AND Switzerland additionally the terms Food System AND Swiss were used. The most relevant source was found to be Frehner et al. (2022) and Kopainsky et al. (2020). The search strings included meat consumption AND Switzerland and alternatively Swiss AND meat consumption yielded the following core papers, for which relevance was particularly attributed to environmental aspects rather than health concerns or papers focused on nutritional aspects of meat: Arnaudova et al. (2022), Götze & Brunner (2021), Sahakian et al. (2020), Schmid et al. (2017), and Tschanz et al. (2022). To identify studies applicable to the local context of Lucerne the search strings meat consumption AND Lucerne and Luzern AND meat consumption was used, which yielded a core study for this thesis being (Weibel et al., 2019). To better understand the local context the literature review was extended from academic peer reviewed papers to grey literature and included local reports, initiatives and policy documents. Furthermore, documentation published in German was considered too. Policy papers were primarily investigated in order to understand the current efforts to change the behaviour of consumers with regards to their meat intake.

Experts

Phone calls, online meetings and e-mail exchange were the primary means to contact and interact with the different experts. The interviews with experts were conducted in German and Swiss-German and notes were taken in writing. Appendix M – List of consulted experts.

The three primary area of interest were current or recent interventions in out-of-home food consumption settings where the behaviour of consumers was targeted. Local government initiatives, local research in food systems and sustainable diets, local gastronomy practitioners and interest groups were considered. One researcher from Zurich was involved particularly in the early stages of the research project to better define the scope and provide sources of recent local research concerning food systems and consumer behaviour (E1). Additionally, three experts in climate and environment from the city and the canton of Lucerne to identify local initiatives from the government were contacted (E2, E3, E4). Two experts in sustainable food and diets, one of whom works primarily in the area of Lucerne whereas the second is active in Zurich, were approached (E5, E6). To better understand the practitioner's perspective in the gastronomy sector, the local tourism office and the local gastronomy association and an individual gastronomy practitioner were consulted (E7, E8, E9). A total of nine individuals, representing the local government, academia, interest groups and the gastronomy sector were used as local experts to better understand current efforts to curb meat intake in out-of-home settings in Lucerne.

2.2.2 Methods used to process information

Literature Review

The results from the analysis of academic literature and grey literature in the form of policy papers, documents or reports from local interest groups were of qualitative nature. Matrixes were used to systematically analyse the content of the different documents and thus generate an overview of themes, findings, research designs and limitations.

Experts

The goal was to develop an overview of the local stakeholders and identify recent or currently active initiatives with the aim to reduce meat intake in out-of-home settings in the context of Lucerne. No specific software or analytical tool was used to analyse the content gathered from experts, as the answers were primarily succinct and of descriptive nature. A matrix was used to track the answers from the experts and to be able to compare these to one another and identify new contacts.

2.2.3 Limitations of Phase 1

The primary limitation of Phase 1 is the considered number of contacted experts. Solely a small set of actors within the Swiss system could be considered for this thesis despite the fact that changes are required from all stakeholders. Given the focus on consumer behaviour, the focus on experts lied on those who typically have direct or at least indirect influence on consumers, when eating out. The primary reason for the limitations were time and scope.

2.3 Phase 2 – Experiment at Restaurant Libelle

Phase 1 helped identify a research gap in the local context of Lucerne aiming to curb meat consumption in an out-of-home setting. It was found that a better understanding of the effectiveness of different interventions targeting changed consumer behaviour concerning meat is needed in the local context of Lucerne. Furthermore, additional experimental research to investigate actual meat consumption was identified as a valuable knowledge gap needing to be filled. The different potential interventions, based on the findings from Phase 1 were presented to the Restaurant and can be found in Appendix B – Overview of intervention at Restaurant. A social norm intervention strategy was deemed as most appropriate to be tested in the restaurant. The results from Phase 2 serve as the basis for Phase 3, which serves as the prerequisite to answer RQ2.

To find out how a social norm statement influences actual consumer behaviour in a restaurant in Lucerne, the intervention was tested during the lunch service for two weeks. Additionally, baseline sales information was gathered the month prior to the intervention. This thesis adopts a field experiment approach to assess the impact of a social norm intervention on the menu items ordered at a local restaurant in Lucerne. Harrisson & List (2004) provide an overview of different criteria to define a field experiment. The experiment has been conducted in a real restaurant, with people in the city of Lucerne who eat lunch and experience real consequences, meaning eating the ordered food and eventually paying for it. Thus, the chosen approach can be defined as a field experiment. Field experiments have been used extensively to test different nudging interventions, especially on the topic of energy consumption (Allcott, 2011; Asensio & Delmas, 2015; Schultz et al., 2007). Allcott, (2011) analysed one of the largest randomized field experiments in history. The program compared the electricity use of almost 600,000 control and treatment households and they could show that a social norm intervention can considerably influence consumer behaviour concerning electricity in the US. Field experiments have also been used extensively to study the effectiveness of food related intervention strategies such as the ones conducted by Filimonau et al. (2017), Brunner et al. (2018), Sparkman et al. (2020), or Kurz (2018).

2.3.1 Pre-study

The primary purpose of the pre-study was to ensure readability and ease of understanding of the different documents presented to the customers during the lunch service and thus a successful completion of Phase 2. The documents of interest included the menus for the intervention weeks, an extra document containing a QR code leading to the online survey and the survey itself (see Appendix C, D, E and F).

The pre-study was conducted with individuals who differ in age and gender. The selected people for the pre-study are considered a convenience sample and include current classmates, classmates from earlier studies or former work colleagues who live in Lucerne and staff from the IIIEE. Furthermore, the texts were checked by two native German speakers to ensure the communication was grammatically correct and easy to understand. The pre-study was conducted in the period from February 3rd to February 17th, 2023, to ensure sufficient buffer time was available to incorporate the changes prior to the experiment.

2.3.2 Methods used to collect data

Baseline and Experiment

The baseline sales information was gathered from the month prior to the intervention. This means that the baseline lasted from January 30th to February 26th, 2023. The baseline was used as a control variable without any changes to the restaurant. The intervention took place from February 27th to March 10th, 2023. All sales data was gathered by the restaurant and provided to the author and can be found in Appendix I – Data Baseline and Intervention.

Customers were randomly assigned to a table, with either a standard menu (see Appendix C – Standard Menu), or a menu containing a social norm statement (see Appendix D – Amended Menu). During the intervention, sales data from two designated table areas were collected. One area which included tables 1 to 7 and tables 16 to 21 received the menu without amendments, the standard menu (see Appendix C – Standard Menu). The other area which included tables 8 to 15 received the menu with the intervention (see Appendix D – Amended Menu). The information box itself contained the following social norm statement: "*Mehr als 70% der Luzerner Bevölkerung hat eine Reduzierung des Fleischkonsums in Erwägung gezogen und bereits in Angriff genommen. Wähle ein Fleischloses Gericht und leiste so einen Beitrag für das Klima.*" (Translated by the author: "*More than 70% of Lucerne's inhabitants have considered and already taken measures to reduce their meat consumption.*

Choose a meatless dish and contribute to the climate.") The rest of the menu remained unchanged and were identical to the standard menu. Thus, both menus contained the same dish options: 1 vegetarian daily menu, 1 meat daily menu, 1 vegetarian weekly special, 1 meat weekly special, and 1 weekly dessert to choose from. Furthermore, all menus contained a starter in the form of a salad or a soup. Drinks had to be ordered separately and were not considered during this study.

Upon completion of the lunch service, which typically lasted from 11 :30 to 13 :30 from Monday to Friday, the service personnel together with the head chef noted the orders per table. This to be able to count the ordered meals both vegetarian and meat per table with the intervention and the tables without the intervention. On average 45 lunch menus were sold per day. The sales data was then forwarded to the author. Additionally, any comments or questions from guests were consolidated and forwarded to author. The reason why no interviews were conducted with restaurant customers was due to the difficulty in gaining customer insights without interrupting the standard business of the restaurant during the lunch service. The detailed description of the process at the restaurant can be found in Appendix H – Process at the Restaurant.

Online survey

To better understand different customer segments of the restaurant, an online survey was used. The aim of the survey was to assist identifying potential variances in consumer behaviour based on socio-demographic characteristics. The online survey can be found in Appendix F. In agreement with the restaurant, an online survey was made available through a QR code. The QR code to the survey along with a short study introduction were provided to the table upon completion of the order, but before the meal was served. In case this was not possible, the QR code was given to the table upon completion of the meal. The QR code was accompanied with information about the study and the fact that a voucher could be won with details available in Appendix E – Introduction to Survey. The reason to use an online survey instead of interviewing guests was that the standard service should not be interrupted, and a short online survey was deemed appropriate for lunch guests. An important addition is that a voucher for the restaurant of CHF 30.-, sponsored by the author, was randomly allocated to one of the participants, willing to leave their e-mail address. The reasons to incorporate the possibility to win a voucher were to increase the willingness complete the survey, receive more responses, and as a sign of appreciation to the restaurant for their efforts.

The data was generated and stored through the use of Google Forms. A password protected account was used to generate the survey, store the data and thus ensure data privacy and avoid any external access to the data. All data was anonymized, and orders could not be tracked to individual customers, solely to a specific table area - either with or without the intervention. The survey can be found in Appendix F – Online Survey.

2.3.3 Limitations of Phase 2

Overall, conducting an experiment in a real-world context presents itself with challenges and restrictions. Firstly, the appropriate time and duration of the experiment had to be established. Together with the managing director and the head chef, it was agreed to conduct the experiment for two weeks during the lunch service from 11:30 to 13:30 from Monday to Friday. It was decided to gather baseline sales data for the month prior to the intervention, thus in February 2023. The primary reason for the lunch service was that during lunch solely four different meal options had to be tracked.

Time and organizational dedication are required from the participating restaurant when conducting such an experiment. The potential interventions were discussed first, the service staff was briefed, an order tracking process was established, different menus were prepared and printed together with the survey questionnaire which was distributed between the order

placement and the food service. Being able to return to business as usual was appreciated by the staff and management of the restaurant, allowing them to focus on their core competencies again, which is making customers happy through food and drinks. Nevertheless, the staff and management were highly interested in the experiment and being part of an academic research process. They were curious about the assumptions, mechanisms of behaviour and the gathered results.

Internal validity threats are particularly relevant for Phase 2 of this research design. The three primary internal validity threats include participants, the use of an experimental treatment and the applied procedures (Creswell & Creswell, 2018). An important aspect to be considered is the selection of participants. The studied sample and the generated sales data is solely from one restaurant from the city of Lucerne and the findings cannot be generalized for the city, the canton or the entire nation. To generalize findings, experiments would have to be conducted in restaurants which cater to other customer segments, in other cities or regions and during different seasons. Random selection of participants would be ideal (Creswell & Creswell, 2018). Moreover, the incentive to win a voucher for CHF 30.- may vary in attractiveness for different consumer groups and thus responses may be skewed. Additionally, the value of responding to a survey for academic purposes may be interpreted differently by various demographics.

Another limitation for the overall experiment is the fact that the author was solely physically present during the first day of the intervention. As such, adherence to the agreed upon procedure could not be validated continuously by the author. Such adherence gaps which may impact the results include: randomly assigning customers to a table (irrespective of the menu provided to this specific table), taking the order and then providing the description with the link to the online survey and lastly correctly logging the order per table. If, for example the customers received the QR code to the online survey prior to the order, the customer may have been biased in their responses. Alternatively, if the QR code was not provided at all, no feedback could have been provided. Lasty, an overview of all lunch options is available online – called the weekly menu. There were no statements present on the weekly online menu. As such, customers may have already decided what to order before entering the restaurant.

2.4 Phase 3 – Evaluation of consumer behaviour

The generated data from Phase 2 served as the basis for Phase 3, ultimately finding an answer to RQ2 - How does a social norm message influence actual consumer behaviour in a restaurant in Lucerne? The data for the evaluation of Phase 3 includes the sales data from the baseline period as well as the experiment and the responses gathered through the online survey. Phase 3 is the prerequisite for the last step of the research design – the interpretation of results.

2.4.1 Methods used for data processing

The sales data gathered from the baseline and experiment periods were recorded and stored digitally through the use of Excel. The restaurant provided the amount of sold meals per day during the lunch service and forwarded the data to the author. The analysis of the sold menus during the baseline and intervention period were analysed using Excel functionalities.

The data generated through the online survey was recorded and stored digitally through the use of Google Forms. The data was treated anonymously and no one but the author has had access to the responses. Upon completion of the intervention period, the responses were downloaded, sorted, and analysed using Excel functionalities. A password protected laptop and a password protected University account were used to collect, analyse and store all data.

2.4.2 Limitations of Phase 3

External validity concerns need to be considered, particularly for Phase 3 of this research The two types of threats to the external validity stem from the interaction of setting and treatment of participants and the interaction of history and treatment (Creswell & Creswell, 2018).

External validity threats occur from the interaction of setting and treatment. Additional experiments in other settings would have to be conducted so see if the results would be comparable (Creswell & Creswell, 2018). Potential other settings include dinner service and restaurants with more customers and other socio-demographic characteristics and other geographies including different language regions within Switzerland. The findings of the experiment are time-bound and thus results cannot necessarily be generalized for past or future situations (Creswell & Creswell, 2018). Together with the restaurant it was decided to test the social norm statement intervention from February 27th to March 10th, 2023. This is when the local carnival is over, which lasted from February 16th to February 21st. The carnival in Lucerne is based on the Catholic carnival and as such the carnival as we know it ends on Ash Wednesday, forty days before Easter when the fasting days start. Carnival is the time leading up to Ash Wednesday starting with Dirty Thursday on February 16th in 2023 (Luzern Tourismus AG, 2023). The local carnival includes parades, musicians, brass bands and attendees with self-made costumes and is accompanied by frivolous behaviour – often considered the fifth season. People tend to fall back to a more regular life- and workstyle after the carnival. Moreover, schools and universities and local businesses in the city of Lucerne tend to be closed during Carnival which may impact the last baseline week. Thus, replicating the experiment during another season would increase external validity to observe whether the same results would have been obtained or not.

2.5 Interpretation of Results

The circle to the very right of Figure 2-1, indicates the final step of the research design when qualitative and quantitative data from Phases 1 and 3 are interpreted and discussed. Chapter 4 - Results and Analysis – provides and overview of the findings from Phase 1 and 3. Chapter 5 - Discussion – is dedicated to the discussion of the gained insights and results. Based on these chapters recommendations are provided to help stakeholder groups in the food system take action to help reduce meat consumption in the context of Lucerne and thus improve the sustainability of the Swiss food system.

3 Literature Review

3.1 Pro-environmental behaviour

As outlined in Chapter 1.1.1 the local climate strategy addressing a climate friendly diet for the canton of Lucerne is primarily based on information and knowledge provision (Kanton Luzern, 2021). Such instruments are vastly based on rational behaviour models (Hansen & Schrader, 1997; Lehner et al., 2016). According to Jackson (2005) rational choice theory assumes that if consumers have sufficient information they act in an environmentally friendly way. Kollmuss & Agyeman (2002) refer to such models as "rationalist models" which were based on the assumption that environmental knowledge will lead to changed environmental attitude and consequently lead to pro-environmental behaviour. In the context of meat consumption, this would mean that if people would receive sufficient information concerning the environmental impact of meat consumption, they would act rationally and thus reduce their intake. Schwegler et al. (2015) claims that meat consumption in Switzerland is highly dependent on the knowledge about the effectiveness of not consuming meat. 85 percent of vegetarians were found to rate the measure of avoiding meat to be very effective. Contrarily, people who consumed meat more than four times per week, only 15 percent shared the assessment. The more impactful avoiding meat is estimated, the less meat is consumed. To curb meat consumption, the authors suggest strengthening information and awareness measures among others.

However, it has been shown that such rational behaviour models do not account for the full complexity of factors which influence individual behaviour and thus rational choice models have been widely criticized (Jackson, 2005; Kollmuss & Agyeman, 2002). Jackson (2005) categorised the criticisms against rational choice in three areas. Firstly, rational choices are hardly ever possible as average people in ordinary scenarios are not in the position to process all required information cognitively to take a rational choice (Jackson, 2005; Simon, 1957). People have developed coping strategies to deal with the cognitive efforts of making a choice. Rule of thumbs are an example of such strategies, which are particularly often applied where choice occurs on a routine basis or habitually (Tversky & Kahneman, 1974). Such choices are often made immediately without taking a conscious decision. Thus, the model developed by Simon (1957) of bounded rationality is more appropriate to understand human behaviour. Secondly, a fundamental criticism against rational choice is the unit of analysis on an individual level. Although, individual choice and the supremacy of the preference of individuals is deeply embedded in the culture of Western societies, our individual decisions are influenced by social norms and interactions and expectations of others (Jackson, 2005). In essence, the question arises whether the individual or social structures shall be the unit of analysis (Jackson, 2005). Lastly, humans do not only act out of self-interest as we tend to be involved in activities with altruistic motives (Jackson 2005).

Given the limitations of the rational choice theory, a broader view needs to be taken. An attempt to better the understanding of factors which can positively or negatively influence pro-environmental behaviour is presented in Figure 3-1 Simplified model of pro-environmental behaviour by Kollmuss & Agyeman (2002). Kollmuss & Agyeman (2002) developed a model of pro-environmental behaviour, acknowledging that no single framework or diagram will be able to illustrate all factors which shape and impact such behaviour. The authors omitted important discussions concerning several factors: a) comfort and convenience, b) habits, c) personality traits and character or d) the concept of community based social marketing. Nevertheless, the model provides a solid conceptual basis to analyse the factors impacting pro-environmental behaviour. In accordance with the earlier outlined limitations of rational choice models, Kollmuss & Agyeman (2002) do not assign a direct relationship between environmental knowledge and pro-environmental behaviour. Rather, the indication in Figure 3-1 shows that

pro-environmental consciousness is a complex construct of attitudes, environmental knowledge and emotional involvement as shown on the left-hand side, being part of the large box coined internal factors. The arrows are indicative how internal and external factors influence one another and ultimately pro-environmental behaviour. Pro-environmental behaviour can stem from reasons other than environment and can include curbed consumption due to a value system nurturing simplicity or because of other external factors such as monetary constraints – these behaviours are indicated by the two arrows directly from internal and external factors to pro-environmental behaviour.

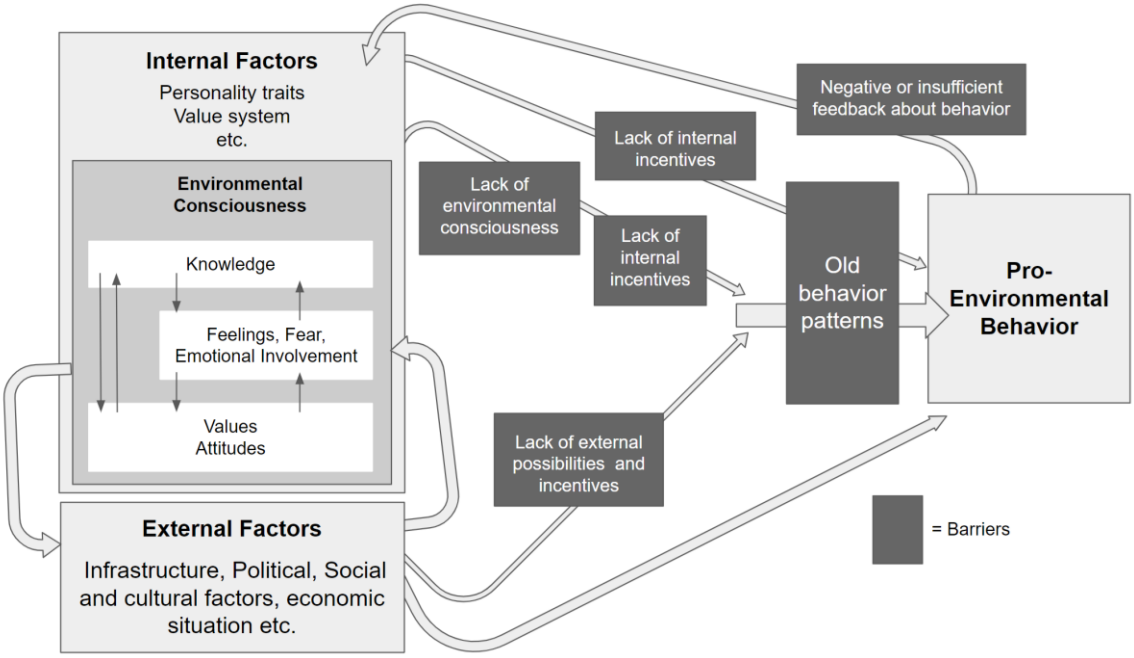

Figure 3-1 Simplified model of pro-environmental behaviour

Source: Own illustration, based on Kollmuss & Agyeman (2002)

One of the main findings by Kollmuss & Agyeman (2002) is that when internal and external factors act synergistically, the biggest impact on pro-environmental behaviour can be achieved which is indicated in Figure 3-1 by the larger arrow. Where internal factors include but are not limited to knowledge, emotional involvement, values or attitudes and external factors to infrastructure, political situation, social and cultural factors or economic factors. The most important barriers to pro-environmental behaviour are illustrated by black boxes. Kollmuss & Agyeman (2002) believe that old behaviour patterns – the largest box representing a barrier to pro-environmental behaviour – are both a very strong and often overlooked barrier and as such need to be highlighted as old habits block all three arrows leading to pro-environmental behaviour. The model in Figure 3-1 has been adopted and applied to the analysis of meat-eating behaviour by Kwasny et al. (2022) and Stoll-Kleemann & Schmidt (2017) and will be explained next.

3.2 Theories, Tentative explanations and conceptual frameworks of relevance to strategies aiming at reduced meat consumption

Stoll-Kleemann & Schmidt (2017) adopted the pro-environmental behaviour model shown in Figure 3-1 developed by Kollmuss & Agyeman (2002) to better understand factors which influence meat consumption in developed and transition countries and thus applicable for the Swiss context. The arrows in the model by Stoll-Kleemann & Schmidt (2017) as illustrated in

Figure 3-2 indicate how different factors impact one another and ultimately meat-eating behaviour. The model is divided into three primary factors which include external, sociocultural and personal elements. Barriers are indicated as black boxes whereas the two grey boxes called internal and extern incentives would help reduce meat consumption.

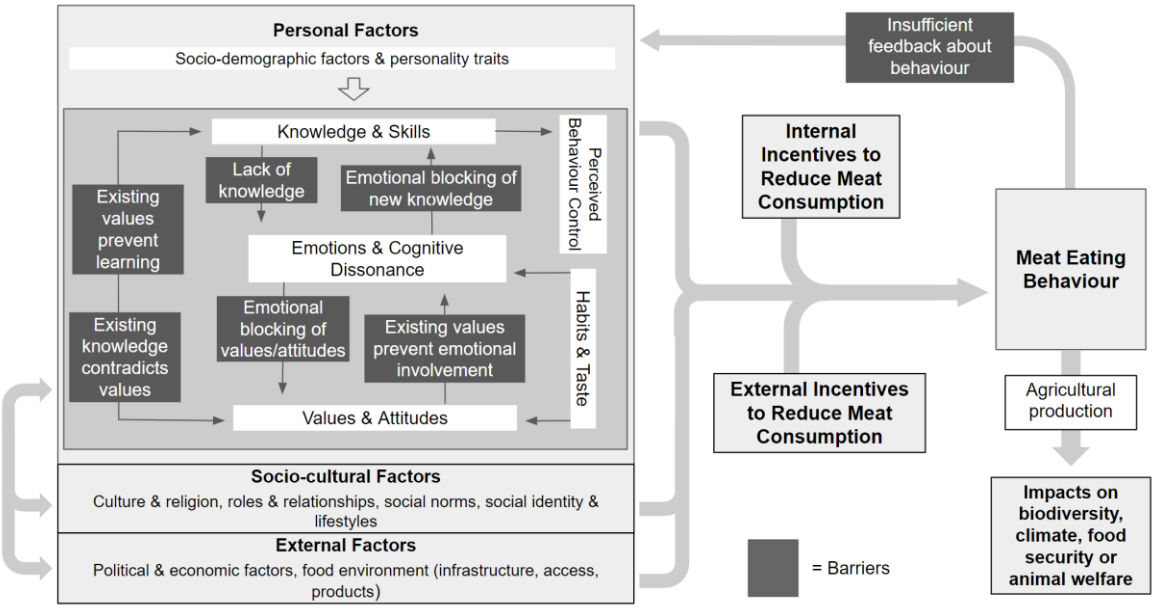

Figure 3-2 Model of factors that influence meat-eating behaviour

Source: Own illustration, based on Stoll-Kleemann & Schmidt (2017)

External factors, on the bottom left of Figure 3-2 are dived into two main areas by Stoll-Kleemann & Schmidt (2017) and include a) political and economic factors and b) the food environment. The former refers particularly to government policies and practices and private corporations to campaign for reduced meat intake. The authors identified subsidies as a highly problematic factor leading to market deformities and suboptimal allocations as financial incentives strongly influence food choices including meat consumption behaviour. The later – food environment – includes the social climate and the physical surroundings of meat consumption or the avoidance of doing so. This can include the availability of non-meat protein sources on restaurant menus or on the supermarket shelves.

Figure 3-2 Model of factors that influence meat-eating behaviour depicts the influential aspects of the socio-cultural factors through the middle grey box on the left. Stoll-Kleemann & Schmidt (2017) identified three primary aspects a) culture and religious traditions, b) social norms, roles and relationships, and c) social identity and lifestyles. The associated barriers to change consumer behaviour are manyfold and include the social marker of meat consumption as a sign of masculinity or prosperity. The symbolism in human power over the natural world through the consumption of meat or the cultural belief that meat provides strength – especially for men or the perceived normative behaviour of peers who are supporting the consumption of meat. The promotion of new cultural and social norms was found to have the ability to address cognitive dissonance and sociocultural related factors. However, the findings in academic literature whether interventions targeting social norms are effective or not are inconsistent (see subchapter 3.4.2).

The largest grey box to the left in Figure 3-2 refers to personal factors. These include knowledge and skills, values and attitudes, emotions and cognitive dissonance, habits and taste,

sociodemographic variables and personality traits and perceived behaviour control. There seems to be a lack in the understanding of the role meat plays in climate change. However just because people understand the value of reducing their meat intake, it does not necessarily mean that this translates into changed diets. Stoll-Kleemann & Schmidt (2017) found that moral values, particularly concerning animal welfare are dominant motivational factors to follow a vegetarian diet. A widely applied strategy to avoid emotional involvement is cognitive dissonance (Festinger, 1957; Stoll-Kleemann & Schmidt, 2017). Habits are among the main identified barrier to change consumer behaviour towards less meat consumption. The most influential socio-demographic factors concerning meat consumption behaviour were found to be age, gender and socioeconomic status (Stoll-Kleemann & Schmidt, 2017). Overall, women tend to eat less meat than men, and people with lower socioeconomic status tend to eat more fatty meats. Individual with higher educational background rather tend to follow a vegetarian diet. Stoll-Kleemann & Schmidt (2017) found in their qualitative assessment the most relevant factors influencing meat consumption to be emotions and cognitive dissonance and sociocultural factors, which will be further elaborated upon next. These factors are influenced by economic factors as well as the food environment, indicated by the arrows in Figure 3-2.

3.2.1 Emotions and cognitive dissonance

Kollmuss & Agyeman (2002) support the hypothesis that the more a person reacts emotionally to an environmental problem, the more likely it is that this person will show pro-environmental behaviour. What makes us care is not an easy answer, nevertheless the understanding by Kollmuss & Agyeman (2002) is used in this paper. Firstly, if we lack the knowledge about the cause and effect of an ecological issue, the emotional involvement tends to be limited. Secondly, we are seeking inner consistency with our believes and mental framework. To achieve such consistence, we selectively accept information which supports our existing values and resist contradictory information – the concept of cognitive dissonance as introduced by Festinger (1957). Kollmuss & Agyeman (2002) argue that we may still not act pro-environmentally even though we experience an emotional reaction towards negative environmental effects. Such emotions are distressing, and we respond differently to avoid such negative feelings and strategies include denial, rational distancing, apathy or delegation. As such Stoll-Kleemann & Schmidt (2017) argue that cognitive dissonance can hinder the acquisition of new knowledge and appropriate values through denial and other mental defence strategies. As people are more likely to adopt a new behaviour, the stronger the emotional reaction – addressing emotions and feelings should be considered rather than rational cognitive matter, as previously outlined by the limitations of the rational choice theory (Kollmuss & Agyeman, 2002; Stoll-Kleemann & Schmidt, 2017). Stoll-Kleemann & Schmidt (2017) propose the use of emotional and symbolic messaging and the promotion of new social norms as opportunities to overcome the barriers associated with emotion and cognitive dissonance to reduce meat consumption.

3.2.2 Socio cultural factors

Kollmuss & Agyeman (2002) state that a person's behaviour is strongly influenced by cultural norms. Stoll-Kleemann & Schmidt (2017) mention the following influential aspects of the socio-cultural factors: a) culture and religious traditions, b) social norms, roles and relationships, and c) social identity and lifestyles. In the West, the symbolism in human power over the natural world is expressed through the consumption of red meat. Contrarily, in various other cultures, particular meat types are attributed with complex taboos and prohibitions (Beardsworth & Bryman, 2004; Stoll-Kleemann & Schmidt, 2017). Adhering to such eating norms is often a cultural norm rather than an explicit choice to be affiliated with a certain social group. Lea & Worsley (2001) found that for men the most influential predictor for meat consumption is the representation of vegetarian and non-vegetarians within their circle of friends. Similarly, Higgs (2015) found that the presence of others at an occasion to where food is consumed has a

powerful effect on the behaviour of the people. Such social connections can act as an opportunity or a barrier to change behaviour and particularly reduce meat intake. This because people amend their meat consumption behaviour to steer their public image and leave the desired impression on their peers (Higgs, 2015; Stoll-Kleemann & Schmidt, 2017). The promotion of new cultural and social norms and enhance the social status of plant-based diets was found to have the ability to address barriers concerning socio-cultural factors (Stoll-Kleemann & Schmidt, 2017).

3.3 Meat consumption in the local context

Understanding the local context and the target group appear to be very important when designing intervention strategies. Stoll-Kleemann & Schmidt (2017) state that, when designing intervention strategies which ultimately aim to reduce meat consumption, target group specific approaches need to be considered. Other authors highlight the importance of tailored interventions, as certain designs may lead to defensive responses from certain consumer groups (Bacon & Krpan, 2018; Kwasny et al., 2022; Lehner et al., 2016). Consequently, the following section aims to provide an overview of the Swiss consumers and factors constituting and influencing meat consumption in Switzerland.

3.3.1 Meat eaters in Switzerland

Policy intervention measures to curb meat consumption are more powerful when tailored to specific consumer groups (Funk et al., 2021; Kwasny et al., 2022). Numerous studies have been recently conducted in Switzerland aiming to produce a segmentation of different consumers concerning their meat intake (Arnaudova et al., 2022; Funk et al., 2021; Götze & Brunner, 2021; Schmid et al., 2017; Tschanz et al., 2022; Weibel et al., 2019). Establishing a broad understanding of meat eaters seems relevant in this context as the vast majority – approximately 90% - of the Swiss population consume meat (Tschanz et al., 2022). At the moment, the social norm in Switzerland is to consume meat four days a week (Kamm et al., 2015).

Figure 3-3 Share of heavy meat eaters in Switzerland and Lucerne, aims to provide an overview of the share of heavy meat eaters in Switzerland and Lucerne. The part of the population who is heavily consuming meat is being called differently in various studies. As Figure 3-3 indicates the percentage of heavy meat eaters varies between 14.7 to 24.3% of the population from left to right. The share of frequent meat consumers is either called passive consumers, uncompromising meat eaters, meat and fish eater or in Lucerne people who have never considered reducing meat consumption. As such there is no agreed upon definition of meat eaters in Switzerland. However, what the figure implicitly tells is that the vast majority of the Swiss population – depending on the study 75 to 85% - have considered or have already reduced their meat intake. A younger population group and their behaviour concerning meat consumption was analysed by Arnaudova et al. (2022). The study aimed to assess Swiss students' meat consumption behaviour in the German and French speaking parts. The authors identified the following consumption clusters: a) passive consumers (14.7%), b) curious consumers (6%), c) awoken consumers (44.7%), and d) active consumers (34.6%). The passive consumers are mostly meat-eaters whose meals contain meat more than 7 times per week. This cluster contains most of the students who still lived with their parents. This group does not show to be interested or convinced in reducing their meat intake and can be found to the very left of Figure 3-3. The second bar from the left in Figure 3-3 shows the study by Götze & Brunner (2021) which aimed to identify specific consumer groups with regards to meat and meat alternatives in Switzerland and revealed the following clusters: a) environmentally and health-oriented meat-eaters (16.8%), b) uncompromising meat-eaters (18.1%), c) moderate meat-eaters who are willing to replace meat (15.9%), d) indifferent but moderate meat-eaters (21.2%), e) environmentally conscious regular meat-eaters (13.7%), and f) environmentally and health-conscious meat avoiders

(14.4%). The uncompromising meat-eaters seems unaware of the negative environmental impact of meat and is assumed that the regular meat consumption stems from habits. This cluster, predominately consisting of men is unlikely to purchase meat alternatives and knows less about food and nutrition compared to the other clusters. Funk et al. (2021) aimed at a consumer segmentation based on stated environmentally friendly behaviour of Swiss consumers in the food domain and identified the following six consumer segments: a) meat- and fish-eaters (19.5 %), b) origin-focused food savers (18.0%), c) ambiguous consumers (28.8%), d) food waste reducing sharers (19.7%), e) renouncement aversives (9.0%), and f) and consequent pro-environmental consumers (5.0%). The first group of meat- and fish eaters mostly consists of males who eat meat and fish almost every day. This segment showed both lowest and highest monthly income and food choices for this group must be practical. To the very right of Figure 3-3, the bar indicates the study by Weibel et al. (2019) who aimed to identify factors involved in reducing meat consumption in the city of Lucerne. The study provides an overview of the observed meat consumption approximately one quarter (24.3%) of Lucerne's residents have never considered reducing meat consumption. The smallest section has considered reducing meat consumption but have not put this plan into practice (8.5%). The largest part makes sure to consume less meat occasionally (41.5%). Taking consuming little or no meat for granted (25.7%). The results of the study conducted in Lucerne by Weibel et al. (2019) show that attitude, personal norms, perceived behaviour control and problem awareness have a significant impact on meat consumption behaviour. For people wo have either never considered reducing their meat consumption or have considered to reduce their meat intake but have not yet put this plan fully into practice - emotions and social norms are seen to be particularly relevant to initiate behavioural change. Individuals with higher levels of education and women were more likely to consciously reduce their meat intake.

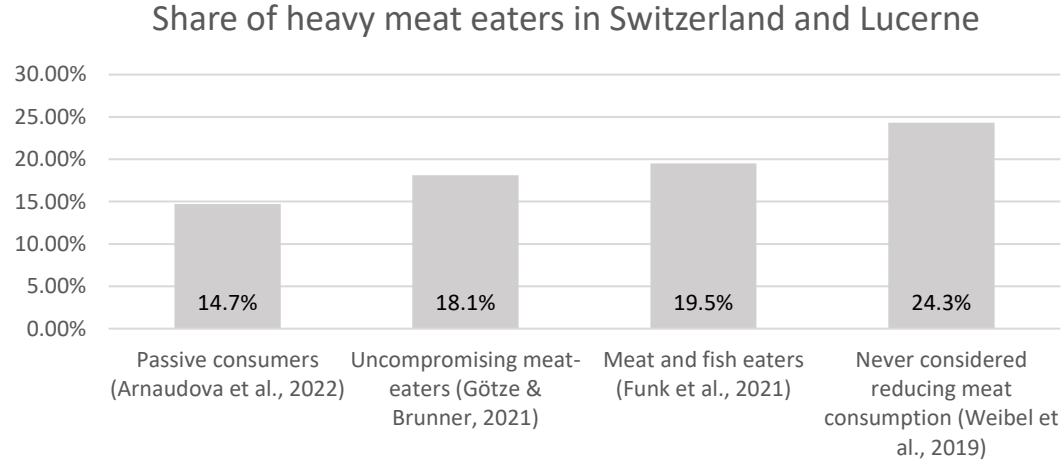

Figure 3-3 Share of heavy meat eaters in Switzerland and Lucerne

Source: Own illustration, based on Arnaudova et al. (2022), Funk et al. (2021), Götze & Brunner (2021), Weibel et al. (2019)

Sociodemographic variables

Overall it can be said that Swiss men consume much more meat and follow a less healthy diet compared to women (Baur et al., 2022; Schmid et al., 2017; Sych et al., 2019; Tobler et al., 2011; Tschanz et al., 2022). The study by Tobler et al. (2011) examined the eating behaviour of the Swiss population in the German and French speaking regions. Gender was found to be the strongest predictors to reduce meat and women were more likely to have already changed their

behaviour and limited their meat intake. Educational level have shown to be important variables when assessing meat intake levels in the Swiss population and higher levels of education tend to lead to lower meat intake levels in Switzerland (Baur et al., 2022; Funk et al., 2021; Sych et al., 2019; Weibel et al., 2019). Contrarily, the educational level amongst students from the University of Zurich did not show to have a significant impact on the respondent's willingness to reduce meat consumption Schenk et al. (2018). Economic constraints were not found to be of relevance (Schenk et al., 2018). The study by Baur et al. (2022) confirmed that taste was more important than price, thus hedonism trumps practical desires in food choices. Schmid et al. (2017) found that the language region, gender and household size were predictors for meat consumption frequency. Participants form the German and French speaking parts of Switzerland consumed meat and meat products more frequently compared to participants from the Italian speaking part (Schmid et al., 2017). The different language regions show variances in the intake of meat and PM – people from the German speaking region consume the least amount of unprocessed meat and the highest amount of PM compared to the French and Italian speaking parts (Sych et al., 2019).

Motivations to limit meat consumption

Baur et al. (2022) reconfirmed earlier findings by Funk et al. (2021), Götze & Brunner (2021), and Schenk et al.(2018) that health concerns are a significant factor motivating the Swiss to curb their meat intake. Baur et al. (2022) found that in Switzerland eating healthy was a more pronounced intention than an environmentally friendly diet. People who wish to eat healthy manage to do so, contrarily the intention to eat environmentally sustainable food could not be related to lower environmental impacts from food choices (Baur et al., 2022). Schenk et al. (2018) assessed a broad set of motivations and constraints to avoid meat with a sample of students at the University of Zurich. Health benefits showed to be more important than environmental benefits and environmental benefits to outweigh ethical benefits of meat consumption. Thus, the more immediate the consequences the stronger the impact of the motivation and constraint (Schenk et al., 2018). Healthy diets are found to be particularly pronounced motives to limit meat intake around women (Tschanz et al., 2022). The assumption by Tobler et al. (2011) that younger people's motivation to curb their meat intake may be for environmental reasons whereas older people may attribute more importance to the health argument does not necessarily hold true.

3.3.2 Local knowledge about diets and their environmental impact

In a large-scale survey Tobler et al. (2011) assessed the beliefs of Swiss consumers concerning their environmental food consumption practices and the corresponding willingness to adopt more ecological food consumption patterns. The authors identified a knowledge gap in the Swiss population concerning the environmental benefits of specific food consumption practices. The respondents perceived the environmental benefit of avoiding excessing food packaging as having the strongest impact, followed by purchasing local foods. The results showed clearly that purchasing organic foods and avoiding meat was believed as having the least environmental benefits. However, reducing meat consumption is generally much more environmentally beneficial than avoiding excessive packaging of food (Jungbluth et al., 2022; Tobler et al., 2011). In 2014 Siegrist et al. (2015) compared the results from Tobler et al. (2011), which were gathered in 2010. Four years later, participants of the same survey perceived the act of reducing their meat intake as significantly more beneficial. However, reducing meat was still perceived as having the lowest environmental benefit and avoiding food with exorbitant packaging was still believed to be the action yielding most environmental benefits. In fact, in both studies avoiding excessive packaging was ranked to have the most benefit on the environment whereas avoiding meat was perceived to have the least impact (Siegrist et al., 2015; Tobler et al., 2011). As such the authors conclude that the public information efforts have not

effectively conveyed the required knowledge to the Swiss population (Siegrist et al., 2015). The finding that Swiss consumers tend to underestimate environmental benefits of curbing meat intake has been confirmed by others such as Kamm et al., (2015) or Schwegler et al. (2015). However, meat is a substantial factor in the environmental impact of the Swiss food system and hence its reduction carries great benefits. Baur et al. (2022) found that a vegetarian diet was believed to yield lower health and environmental benefits than other diets such as an organic diet or one based on regional products. A vegetarian diet yields an approximate reduction by 42% and a vegan diet saves as much as 67% in the diet's carbon footprint compared to average diet in Switzerland (Baur et al., 2022). In addition to the lack of knowledge concerning environmental effects of meat intake, Hagmann et al. (2019) found that 81% of men and 69% of women in their study who declared to have a rather low meat intake, exceeded the recommended upper limit of three portions of meat per week by the Swiss dietary guideline.

3.3.3 Social identity and lifestyles

Food choices have become life-style decisions and this holds true for meat avoidance or the lack thereof – what people eat or avoid to consume has an effect on their public image (Stoll-Kleemann & Schmidt, 2017). Vegetarian self-identity has been found to be a direct and important factor determining the willingness of students to avoid meat (Schenk et al., 2018). Once developed, Schenk et al. (2018) found that the vegetarian self-idetnty funtions as an end in itself – it works in an automated and hollistic way. Tschanz et al. (2022) used smoking, health status, diet and physical activity levels as proxies for the factor of lifestyle and its impact on meat consumption. Current smokers compared to those who have never smoked and individuals who were obese and overweight compared to those with normal a BMI were found to have increased levels of meat intake.

3.3.4 Culture and norms

The four official languages of Switzerland and its geographical location have allowed for various influences and hence local customs differ. There are differences in what is consumed in different languages regions (Sych et al., 2019). The combined mean daily intake of both processed and unprocessed meats was lowest in the German speaking part, and most sausages are consumed in the German speaking part whereas the Italian speaking part consumes most ham (Sych et al., 2019). Contrarily, Tschanz et al. (2022) found that consumption of both processed and unprocessed meats was highest in the German speaking part of Switzerland. Similarly, study participants form the German and French speaking parts of Switzerland consumed meat and meat products more frequently compared to participants from the Italian speaking part (Schmid et al., 2017).

There is an overall strong national cultural heritage of the Swiss cow and the associated consumption of meat and dairy products (Sahakian et al., 2020). As such vegan and vegetarian diets are competing with the Swiss cow as part of a constructed national identity closely linked to alpine landscapes, idealizing a past which was more authentic and purer (Sahakian et al., 2020). In their study Sahakian et al. (2020) aimed to understand the emotional dimension of the Swiss initiatives concerning 'no', 'low' and 'pro' meat intake. Actors promoting meat consumption – primarily private actors including retailers, producers or regional development or cultural heritage organizations - emphasize the quality of the animal's life and hence do not aim to hide the origins of the animal, but hardly showing the act of killing the animal – a fast forward from happy life to becoming a dish for human consumption. Points concerning autonomy and free choice are frequently raised, particularly by the main Swiss national meat lobby. Contrarily, vegan and vegetarian movement promoting meat-free diets are primarily represented by NGOs and further include restaurants, retailers and their labels, food producers or citizen associations. Initiatives contain recipes, buying guides, cookbooks or blogs aim to raise general awareness of

environmental concerns and animal wellbeing. The goal is to alter the currently dominant norms and question the need for meat as a fundamental part of a meal (Sahakian et al., 2020). The debate around 'pro', 'low, and 'no' meat consumption in Switzerland is described as passionate by Sahakian et al. (2020) and the positive and negative emotions are considered to carry the potential to promote and hinder attempts towards the common understanding of a healthy and sustainable diet.

3.3.5 Swiss dietary guidelines

The understanding of what constitutes a healthy and sustainable diet is a highly debated topic both globally and in Switzerland. A healthy diet does not necessarily consider environmental aspects whereas the vast majority of sustainable diets incorporate the aspect of human health – this holds true globally as well as for Switzerland (Godin & Sahakian, 2018). There are overlaps and tensions between and a lacking hierarchy of the dominant prescriptions of what healthy and sustainable diets are. The most dominant prescriptions in a Swiss context include a) eating as a pleasure, conviviality; b) balanced diet as per the Swiss Food Pyramid; c) natural and organic diets; d) local and seasonal diets; e) less of better meat consumption; f) vegetarian and vegan diets; and g) slimming diets (Godin & Sahakian, 2018). The authors identify workplace or school canteens as opportunities to demonstrate more environmentally friendly and healthier diets.

Teschner et al. (2021) investigated Swiss dietary guidelines of various state and non-state actors to evaluate the incorporation of sustainability aspects in their recommendations. As consumption and production of foods are mediated through what could be considered a sustainable diet, the dietary guidelines provide a valuable starting point to better understand local dietary habits and the discourse concerning healthy and sustainable diets. Figure 3-4 shows the different focus areas of selected actors, where the illustration is of descriptive nature rather than a normative tool. The stakeholder groups include EAT referring to the EAT-Lancet Commission, SV Group the largest community catering company in Switzerland, Nestlé represents the largest global food and restaurant company, headquartered In Switzerland, Switzerland's largest nature conservation organization WWF and the Swiss Government.

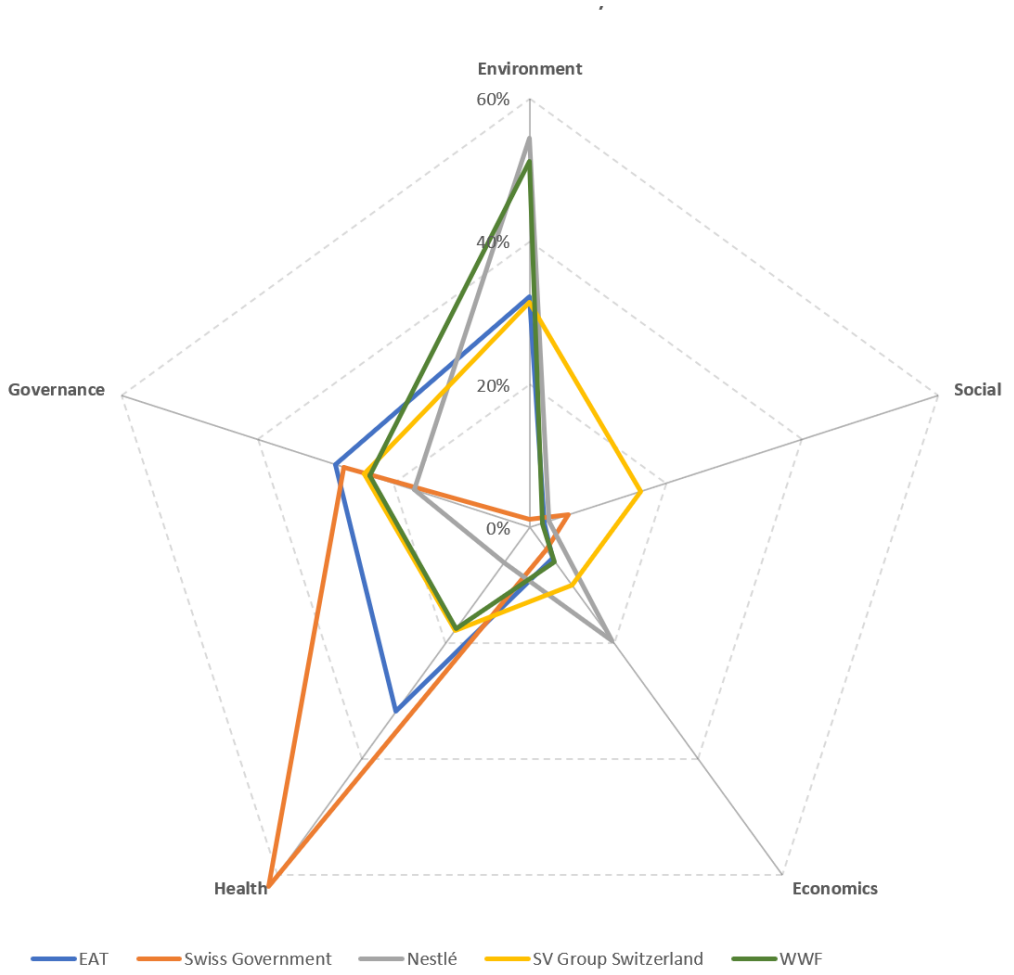

Figure 3-4 An Overview of Swiss Dietary Guideline Profiles

Source: Own illustration, based on Teschner et al. (2021)

Teschner et al. (2021) found that all stakeholders address at least one dimension of sustainability where health, environment and governance appear to be the most frequently considered. The Swiss government primarily focuses on health concerns and fails to incorporate extended environmental sustainability considerations for their dietary guidelines, which is contradictory to the government's broader sustainably policy primarily driven by the Paris Agreement and the SDGs (Teschner et al., 2021).

3.3.6 Economic and Political Factors

External factors influencing meat consumption can be generally dived into two main areas and include a) political and economic factors and b) the food environment – as indicated on the bottom left of Figure 3-2 by Stoll-Kleemann & Schmidt (2017).

The canton of Lucerne is an agricultural intense area, and its barns keep more than 30% of all pigs in Switzerland (Kanton Luzern, 2017). In 2020 the local population of 416,000 inhabitants was outnumbered by pigs with more than 420,000 counts (Haas, 2021; Rohner, 2022). There are an additional 147,000 cattle, almost 1.4 million chicken and other farm animals such as sheep, horses or goats to be found in the canton of Lucerne (Rohner, 2022). Soil, climate, topography as well as expertise and existing infrastructure are favourable for livestock farming

based on forage production and the canton's agricultural sector generates approximately 80% of its production value through animal processing such as milk, meat or eggs. Arable farming take s minor role and fruit, vegetables, berries and wine only account for approximately 6% of the production value (Kanton Luzern, 2017). Animals are therefore an important pillar for the financial viability of the agricultural sector in the canton of Lucerne. The region of Lucerne is an intense agricultural area with a large number of farm animals, where almost 80% of the agricultural land is used for forage production (Kanton Luzern, 2017).

Stoll-Kleemann & Schmidt (2017) claim subsidies to be highly problematic as they distort the market as consumers will struggle to curb their meat intake if meat is cheap. Subsidies and incentive structures were found to be a challenge in multiple nodes of the Swiss food system (Fesenfeld et al., 2023). The authors recommend the discontinuation of public support to advertise meat products – currently the Swiss meat association receives CHF six million per year to finance meat marketing campaigns. The need for positive incentives has been identified in numerous areas and include research and development of meat alternatives, promotion of sustainable and healthy food in out-of-home settings, promotion of precision agriculture and locally adapted plants, or financial support for agencies promoting sustainable nutrition (Fesenfeld et al., 2023).

Overall, there is consensus with regards to who needs to take action within the Swiss food system in order to improve its environmental sustainability – efforts are required from all stakeholders in the system (Der Bundesrat, 2021; Fesenfeld et al., 2023; Frehner et al., 2022). A coordinated action plan for the Swiss food system is required, which would include all relevant actors from consumers to transportation, gastronomy, retail and processors all the way to producers. Stolze et al. (2019) state that neither agricultural producers, the food industry or a majority of consumers can be expected to altruistically change their behaviour of an entire sector to better the food system in the long run. Stolze et al. (2019) found that healthier food consumption carries the potential to simultaneously benefit environemental and social sustianability. However, there are important tradeoffs to be made as an optimal diet geared towards human helath does not necessarily yield the highest resource efficiency. The authors argue that a commonly shared vision of how the Swiss food system should look like is needed and recommend a stronger alignment between health, agricultural and food policies. Furhtermore, policy makers are adviced to create sociodemographically targeted prevention campaigns, reduce incentives for meat and sugar production, reduce the recommended consumpiton levles of dairy products, tax specific foods and production practices, incentivise products with positive health impacts and reconsider regulations concering food waste as animal feed or expiration dates (Stolze et al., 2019).

Frehner et al. (2022) recommends the following policies to target a changed consumer behaviour: information campaigns, financial instruments to impact relative prices, enhanced nudging, or bans. Polices which aim to impact the allocation of resources between production and consumption could include advertisement through larger retailers and taxing or even banning less sustainable products. The authors highlight the need for a coherent and smart policy mix to drive a transition of the Swiss food system. Coordination with all relevant stakeholders from production, processing, retail to the gastronomy, transportation and consumers is considered essential (Frehner et al., 2022). Production supply and consumption demand is mediated through dietary choices (Willett et al., 2019). The question remains how the current environmentally detrimental and unhealthy Swiss diets can be changed. Kopainsky et al. (2020) states that for the Swiss food system policy interventions influencing diets require accompanied strategies at the production level. Furthermore, the required changes in diets are so fundamental that no single policy will be able to address the matter – there is a combination of instruments needed from pricing to the food environment to agricultural practices.

3.3.7 Attitudes towards meat reduction interventions

In early 2023, a committee of over forty researchers published a guide for a sustainable Swiss food system (Fesenfeld et al., 2023). The core principle is to first provide targeted support and gradually increase the requirements. Four main phases of change are presented leading up to 2030. The first step contains the establishment of a transformation fund which would be using information and educational measures as well as targeted financial instruments to reduce transformation barriers. In a second step incentives and first regulatory measures would be introduced. Thirdly, further agricultural policy measures and support for farmers should be introduced. Lastly, profound regulatory measures would be introduced. A holistic and strategic new direction is required for the Swiss food system (Fesenfeld et al., 2023). Richter et al. (2023) found that policy measures with low coerciveness or with voluntary characteristics show a higher degree of acceptance. Direct meat reduction measures with a high degree of coerciveness are particularly often rejected by interest groups, organization form the food industry and political parties. The study by Richter et al. (2023) assessed the acceptance of different policy instruments aiming at reduced meat consumption by different stakeholders of the Swiss food system, arguing that understanding the socio-political acceptance of different policies is essential for their implementation success and long-term existence. The identified key stakeholders in the Swiss food system including government institutions, political parties, cities and mountain regions, national umbrella organizations of municipalities, relevant business associations, the economy and agriculture, civil society actors as well as relevant economic and research institutions in the context of the Swiss food system. Individual citizen or consumers were not considered. Figure 3-5 shows the acceptance of 37 meat reduction measures, where the number in the figure represent the number of individual stakeholders – 23 in total. Looking at policies targeting consumption and demand sustainable diet education is the most highly accepted measure – these measures can be found on the top of Figure 3-5. Information and prevention campaigns on sustainable and healthy diets were also accepted by the vast majority of stakeholders. Contrarily, regulating nudging for meat alternatives, limiting the amount of meat offered in public catering and increasing the VAT for meat products or introducing VAT exemption for vegetable foods were among the most rejected measures and can be found on the bottom of Figure 3-5 (Richter et al., 2023).

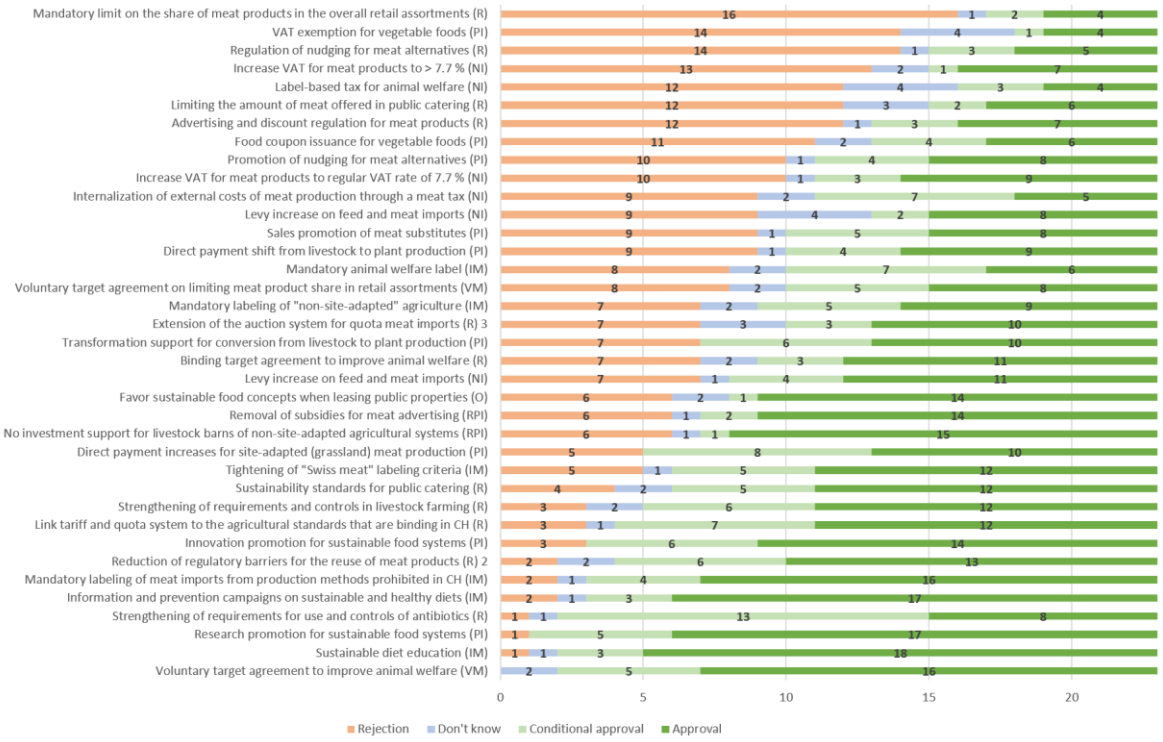

Figure 3-5 Acceptance of meat reduction measures in Switzerland

Source: Own illustration, based on Richter et al. (2023)

Since the focus of this thesis lies on consumption patterns, more attention is given to consumer related interventions, which does not mean that they would be effective in themselves or that policies targeting other actors in the food system would be more or less effective. Looking at the required actions from Swiss consumers a reduction in dairy and red meat is needed, where a reduction in meat is particularly required from men, as they tend to eat significantly more meat compared to women (Baur et al., 2022; Ernstoff et al., 2020; Schmid et al., 2017). Even when a kilocalorie-equivalent daily diet is applied to normalize the difference in energy intake between men and women - women's kilocalories intake is generally lower – men were found to consume almost double the amount of meat compared to women (Ernstoff et al., 2020). To achieve the goal of reduced dairy and meat intake, various policies targeting consumers are considered appropriate. Arnaudova et al. (2022) highlights the need for differentiated strategies to reduce meat consumption per consumer groups, to ultimately also help change social norms. Baur et al. (2022) highlight two areas of focus to help reduce meat consumption in Switzerland which include a) increasing the acceptance that a low meat or vegetarian diet provide health and environmental benefits and, b) closing the gap between the intention of following an environmentally sustainable diet and the actual behaviour.

Other consumer-oriented interventions could include educational offers and should be provided for people in different contexts. State-controlled labelling scheme for environmental, health and animal welfare to motivate and support consumer in taking environmentally beneficial consumption decisions could be another strategy. Moreover, information campaigns to show the importance and benefits of food waste reduction and a primarily plant-based diet could be part of a policy mix. Fesenfeld et al. (2023) states that the goal of these efforts should be to change the public environmental consciousness and social norms. The authors suggest public information campaigns to change public knowledge, consciousness as well as social norms concerning food consumption patterns which heavily rely on plants. Weibel et al. (2019)

suggest social norm framing as a potentially effective intervention to change the behaviour of people who previously did not consider reducing their meat intake, which are approximately 30% of Lucerne's population. Thus, there is value in confirming these suggestions through testing actual consumer behaviour in a real-world setting (Kwasny et al., 2022; Stoll-Kleemann & Schmidt, 2017). Kamm et al. (2015) recommends testing social norm framing aiming at reduced meat consumption in Switzerland. Consequently, the intervention strategy studies which aim at social norms are discussed next.

3.4 Current Knowledge related to intervention strategies aiming at reduced meat consumption

3.4.1 Interventions aiming at reduced meat consumption

Previous research aimed at better understanding strategies to reduce meat consumption and has identified various intervention strategies to change consumer behaviour. The possible interventions are primarily directed at three main focal areas, previously explained in Chapter 3 and illustrated in Figure 3-2: a) personal factors, b) socio-cultural factors and c) external factors (Harguess et al., 2020; Kwasny et al., 2022; Stoll-Kleemann & Schmidt, 2017). The success of an intervention – defined as its ability to change the diet of the consumers - is dependent on the following: a) socio-cultural variables such as religion, culture, the norm of peers or dietary identity, b) socio-demographic variables, including but not limited to age, gender or socio-economic status, and c) personality traits such as political orientation, conscientiousness, or extraversion. Different interventions such as information or dynamic social norm messages address different factors. Personal factors such as knowledge or skills are addressed when providing information whereas dynamic social norm messages target socio-cultural factors. The success of an intervention may vary among different individuals. In order to maximize the success of an intervention the context and variables influencing individual behaviour need to be considered (Kwasny et al., 2022).

Based on the papers by Harguess et al. (2020), Kwasny et al. (2022), and Stoll-Kleemann & Schmidt (2017) the various intervention strategies were summarized and presented to the restaurant (see Appendix B – Overview of intervention at Restaurant). The different intervention options were introduced together with an applied example. The managing director together with the head chef analysed and discussed the different options. Further clarifications were provided through e-mail and discussed in a face-to-face meeting. Information provision targeting knowledge and skills, attitude and values, and social norms, changes to the visibility, and amount of meat (except for a piece of meat) were considered as adequate interventions to be tested in the restaurant.

Globally, in a Swiss context and in Lucerne the effectiveness of interventions in real life context which target socio-cultural factors such as social norms lack in evidence and it is recommended to gain a better understanding of the potential of such interventions (Kamm et al., 2015; Kwasny et al., 2022; Weibel et al., 2019). Similarly, Stoll-Kleemann & Schmidt (2017) conclude that little is known about interventions which aim at social norms and other socio-cultural factors. There is a need for real-life studies, where participants have actual consequences to bear including eating and paying for the food. This thesis addresses this lack by testing the intervention strategy of a social norm statement in the local context of Lucerne in a real restaurant during lunch service. Testing this intervention strategy in the local context of Lucerne seems valuable as it helps to better understand the potential of interventions targeting socio-cultural factors. How exactly and why social norm interventions work in practice will be explained next.

3.4.2 Targeting social norms

Sunstein (1996) defines a norm as an approved or disapproved human behaviour. Norms come in various forms and exist for various matters such as littering, singing or which seat to take on public transportation. Such social norms can promote well-being and liberty but also hinder such development. Whether the norm is constituted through a specific law (such as for littering), social norms are reinforced through social sanctions which could be embarrassment or shame. Numerous advancements in health and safety policy can be attributed to changed norms, meanings and roles. However, so are the most severe current societal problems, which includes the currently unsustainable levels of meat consumption. The current Swiss social norm averages at four days a week of meat consumption (Kamm et al., 2015). An important takeaway from Sunstein (1996) is, that norms have been changed before and changes in norms carry the potential to be one of the most effective and cheapest ways to improve a society's situation.

Schenk et al. (2018) found that convenience, vegetarian self-identity and social norms emerge as the primary determining factors of the intention to avoid meat. The study was conducted as an online-survey with over 800 students from the University of Zurich, Switzerland. Blondin et al. (2022) found in an online survey that presenting messages with environmental content can be an effective way to motivate consumers to choose vegetarian options. Different messages were tested and the one with a social norm statement (90% of Americans are making the change to eat less meat" followed by "join this growing movement and choose plant-based dished that have less impact on the climate and are kinder to the planet") lead to almost twice as many vegetarian dishes compared to the control group. The need to test these findings in a real-world context has been identified. Sociodemographic characteristics such as race, gender, age, education or income did not influence the impact of the message on the ordering behaviour of the study participants. De Groeve et al. (2019) used a convenience sample of bachelor students at the university of Ghent in Belgium where an online experiment was conducted. A key finding is, when perceived inconsistencies are considered, how and who advocates for reduced meat consumption impacts the legitimization of meat reduction messages. Perceived inconsistency is when a meat-eater advocates for reduced meat intake amongst other meat-eaters. Recipients of messages tend to be more tolerant of perceived inconsistency when inclusive language such as "we" is used compared to personal language such as "you". No bias was found against vegetarian campaigners. The study by Sparkman & Walton (2017) includes multiple experiments, where Experiment 4 used a graduate student sample at a café at Stanford University which was provided with normative information. They found people who received a dynamic-norm messages had an increased tendency to reduce meat consumption compared to the control group or participants who receive a static-norm message. Sparkman & Walton (2017, p. 1665) provide the following example of a static-norm statement "Recent research has shown that 30% of Americans make an effort to limit their meat consumption. That means that 3 in 10 people eat less meat than they otherwise would." Contrarily, the dynamic-norm condition would read as follows "Recent research has shown that, in the last 5 years, 30% of Americans have now started to make an effort to limit their meat consumption. That means that, in recent years, 3 in 10 people have changed their behaviour and begun to eat less meat than they otherwise would."

Çoker et al. (2022) tested descriptive social norm interventions in a retail chain's restaurants based in the UK. No evidence for the effectiveness of the intervention could be produced. The absence of a measurable effectiveness of the intervention is also attributed to low adherence of the intervention instructions certain sites. Sparkman et al. (2020) found dynamic norms on restaurant menus can lead to increased vegetarian and reduced meat orders in field experiments and online studies. However, fewer vegetarian orders were made in a specific context when social norm messages were on the menu during dinner service, when more affluent customers were present. The findings concerning the effectiveness of social norm statements are mixed

and generalisation seems difficult. This reiterates the need for context specific interventions and the necessity to understand what works in a given context prior to rolling out a wider policy program.

3.4.3 The basics of Nudging and how it works.

The theory by Kahneman (2011) is an important contribution to the understanding of human behaviour and a cornerstone of why nudges work. It builds the basis of research articles involving nudges to change consumer behaviour (Kurz, 2018; Langen et al., 2022; Lehner et al., 2016). In his book, Kahneman (2011) distinguishes between two systems which he coined System 1 and System 2. These systems are not systems in control of our actions or small goblins who steer our behaviour. These are merely references for a two-system approach to human judgement and choice. System 1 quickly and automatically operates with little or no effort. This includes recognising objects, avoid losses, or reading social situations. Many actions by this system run on autopilot. System 2 operates slowly and consciously and requires attention and effort. A primary function of this system is to control and monitor suggested actions and thoughts from System 1 (Kahneman, 2011). We only have a given amount of self-control which System 2 activities require as they need attention and effort. Upon completing a task requiring self-control one is less likely to make another effort. Furthermore, when situations are complex or one is under time-constraints or other pressures System 1 tends to take over, which can lead to decisions which may be considered suboptimal, such as choosing a dish containing meat compared to a vegetarian or vegan alternative.

Thaler & Sunstein (2008) built upon the findings of earlier research including (Tversky & Kahneman, 1974) and wrote the book Nudge. Nudges according to Thaler & Sunstein (2008) should not impact the freedom of choice or the price. Such nudging is often referred to as a tool which is beneficial for individuals or society a whole but has not been widely or fully adopted yet. Nudge interventions on food menus are based on the fact that specific nudges work when System 1 is in control, and such interventions can include default options or changed visibility. In essence, a nudge takes advantage of System 1 and presents the options so that the resulting choice is in accordance with the desired outcome, such as healthier or more climate friendly food choices (Kurz, 2018; Langen et al., 2022; Lehner et al., 2016).

3.4.4 Ethical considerations when Nudging

Norms and messages used in the context of nudging mechanisms have their own ethically relevant considerations (Blumenthal-Barby & Burroughs, 2012). The authors highlight three main ethically relevant dimensions: firstly, one must ensure to not cause more harm than good when nudging people. This has been considered, since consuming less meat yields benefits for the vast majority of the Swiss population – from an environmental and health perspective. Secondly, when creating a narrative, the provided message needs to be true. The chosen social norm message, on the menu for this thesis is true and based on recent research by Weibel et al. (2019). Lastly, the power differential between sender and receiver of the message ought to be considered. This cannot be fully addressed as there is indeed a lack in knowledge of the environmental impact of certain food items among certain population groups in Switzerland. The author may indeed possess more information and have acquired greater knowledge concerning meat consumption, including its environmental impact as well as how to potentially influence the current behaviour, compared to the average Swiss citizen or inhabitant of the city of Lucerne.

Lehner et al. (2016) highlight the need to balance the intervention's proportionality of the seriousness of a behaviour and the impact which is trying to be changed. The majority of the Swiss population is generally willing to adopt more ecologically sustainable behaviour

(Schwegler et al., 2015). As such a nudge is considered a legitimate strategy to influence consumer choice as it appears to be a combination of external, sociocultural and personal factors which hinders people from making more ecologically sustainable purchases (Kamm et al., 2015; Kwasny et al., 2022; Stoll-Kleemann & Schmidt, 2017). In accordance with Thaler & Sunstein (2008), the nudge in the form of a social norm statement aims to change people's behaviour positively to make their lives better, healthier or longer without forbidding any of the options or significantly amending the economic incentives. In short libertarian paternalism.

The Swiss are motivated to adopt healthy and more environmentally friendly lifestyles - reduced meat consumption yields considerable environmental and health benefits. Hence, the author supports the view by Kamm et al., (2015) who state that a nudge can be a legitimate means to influence people in a way that is aligned with their values. As such, the author argues that assessing the impact of a nudge in the local context is a just action. Sunstein's (1996) argument shall be highlighted, which states that changing social norms can be a vehicle for change, allowing the vast majority of society to benefit, which holds true when aiming to keep the Earth system stable.

4 Results and Analysis

4.1 An overview of consulted local catalysts

The purpose of Figure 4-1 is to illustrate the focus of this thesis within the food system and which aspects have been covered and which are out of scope. The grey part to the left "Out of scope" indicates the areas of the food system which have not been investigated in depth due to time and scope constraints. These are still crucial actors within the Swiss food system and need to be considered when developing solutions. Nevertheless, the focus has been on the right-hand side, indicated with green colours. The figure shows that academia, the tourism bureau, the gastronomy association, individual restaurant, public health professionals, the city's and the canton's environmental department, and consumers were considered. All these actors are embedded within the local policy framework. The reason why these catalysts have been consulted is that they either have a direct influence on consumers or are directly connected to the consumer through the food system.

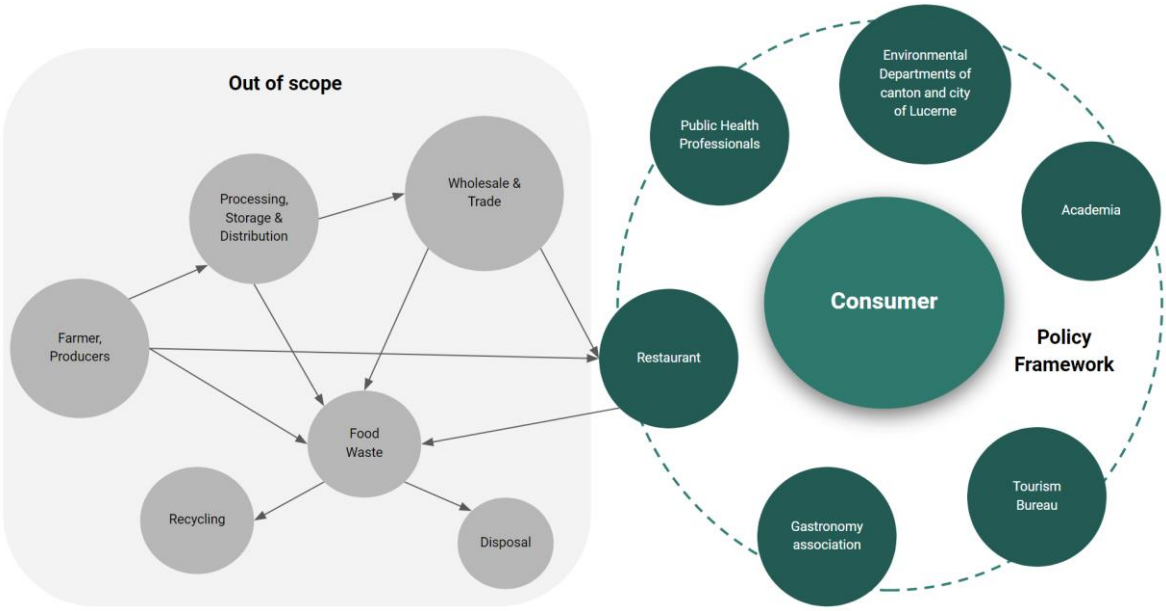

Figure 4-1 Analysed catalysts of the local Food System

Source: Own illustration

The actors in Figure 4-1 were identified through previous research, local policy papers, past initiatives or through recommendations stemming from interviews with catalysts active in the area of Lucerne.

4.1.1 Local initiatives and interventions to curb meat consumption

The considered local catalysts confirmed the current lack of campaigns, interventions or strategies which target the reduction of meat consumption in out-of-home settings.

A climate expert working for the canton of Lucerne mentioned that vegetarian options were readily available when grocery shopping. However, the expert observed difficulties to make meat free choices when frequenting a restaurant or other out-of-home establishments. The individual was not aware of any current initiative specifically targeting restaurants to drive a change in consumer behaviour concerning meat (E3). Another representative from the environmental department of the canton of Lucerne stated that the department is primarily

focused on food waste initiatives and is currently not driving a change in consumer behaviour concerning meat intake in the out-of-home sector (E2). Similarly, a member of the local sustainable alliance for resilience and evolvability confirmed the difficulty in the gastronomy sector as restaurants very seldomly offer a menu according to the planetary health diet. The need to tackle meat consumption in the out of home sector is acknowledged by a representative of the canton's environmental department and a clinical surgeon who is also an advocate for the planetary diet (E4, E5).

A city representative confirmed to be aware of different initiatives concerning food, but is not aware of one specifically targeted at reduced meat consumption in the gastronomy and seems to lacks a big-picture overview of current initiatives concerning food or meat consumption (E4). Nevertheless, the city of Lucerne has not been ignoring the calls for action and initiated a working group for sustainability matters in the local gastronomical sector in 2022. However, the working group swiftly disengaged, solely existed for the kick-off meeting and does not exist anymore. The sector is said to be currently too occupied with other matters and the region of Lucerne is believed to be too conservative, where Basel or Zurich may be more receptive for change (E8). This is indeed the case, exemplified by the recent introduction of a Charta for climate friendly, health promoting and pleasurable offers of the gastronomy in Zurich. The Charta is supported by the city of Zurich's environmental and health department, the gastronomical association of the city of Zurich and the local stakeholder group healthy3 – an initiative for sustainable nutrition and a healthy lifestyle (Healthy3-stakeholdergroup, 2023).

The latest initiative which directly targeted consumers in out-of-home settings lasted from 2017 to 2020. The pilot project was called "lunchidee", which was abruptly stopped due to the Covid-19 lockdown in spring 2020. The idea of the project was to promote sustainable eating culture and gastronomy – thus guests and restaurants together with their chefs were targeted (E6). A representative from the tourism centre in Lucerne mentioned the following projects concerning food: "Too Good To Go", "Madame Frigo" or "Ässbar Luzern" (E7). These efforts are primarily food-waste initiatives, and do not address the need to change the behaviour concerning meat consumption. Restaurants and all other tourist establishments have the possibility to sign up for a newly created label Swiss stainable (E9). Nature and landscape, water, air and soil, energy and climate, mobility, waste and the need to consider food allergies are explicitly mentioned as important sustainability topics. However, the guideline of the label does not explicitly mention the need for changes in diets and food consumption patterns or the overall need to reduce the production and consumption of animal products as important focus areas for a more sustainable future. (Geschäftsstelle Swisstainable, 2022). Lastly, basic and further educational institutions for chefs seem to lack drive for change. For example, exams for head chefs still constitute around meat dishes and the canteen where the aspiring chefs or head chefs eat does not frequently offer an exciting vegetarian option (E9).

4.2 Baseline and Intervention Results

The following section provides an overview of the results gathered at the restaurant. The section entails both the presentation of the orders as well as the online survey. The gathered data is analysed and interpreted to ultimately draw conclusions for the local context. Overall, no major obstacles were observed by the staff to follow the experiment procedure as indicated in Appendix H – Process at the Restaurant. No questions from guests were asked to the author concerning the experiment setup or the survey.

4.2.1 Sales data analysis

During the entire period which includes the baseline and intervention periods from Jan 30th to March 10th, 2023, a total of 1176 lunch orders were tracked from Mondays to Fridays, of which

43% were vegetarian or vegan orders and 57% meat orders. To increase the robustness of the findings of the effect a social norm statement has on customer orders during the lunch service, baseline information was collected during the period from January 30th to February 26th, 2023. The intervention experiment took place from February 27th to March 10th, 2023. Figure 4-2 provides an illustrative overview of the different duration timelines and orders per period.

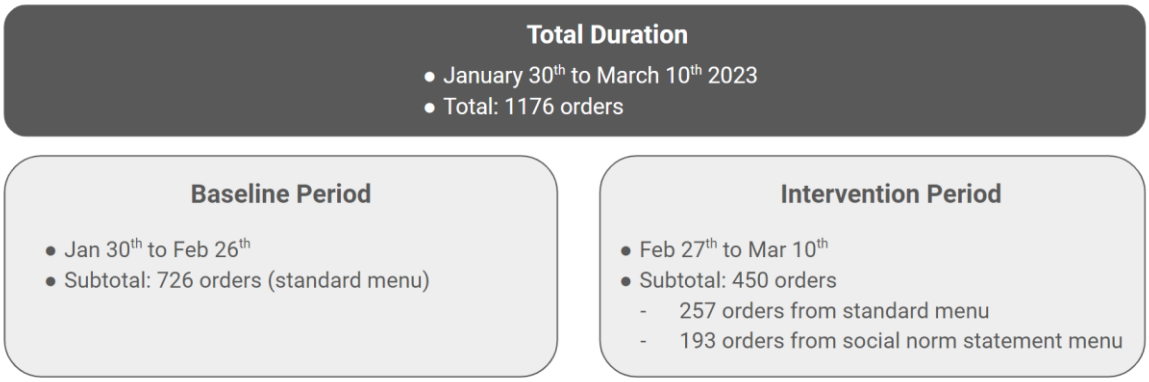

Figure 4-2 Baseline and Intervention Timeline Overview

Source: Own illustration

During the baseline period a total of 726 orders were taken during the lunch services from Mondays to Fridays. Of these 41% were vegan or vegetarian orders and 59% meat orders. Figure 4-3 Overview of lunch orders baseline, provides an overview of the order pattern throughout the baseline period. The meat orders are highlighted in red and orange, whereas the orders in light and darker green represent vegetarian and vegan orders. Figure 4-3 shows starkly varying order patterns between different days. The full overview of orders during the baseline and intervention period can be found in Appendix I – Data Baseline and Intervention.

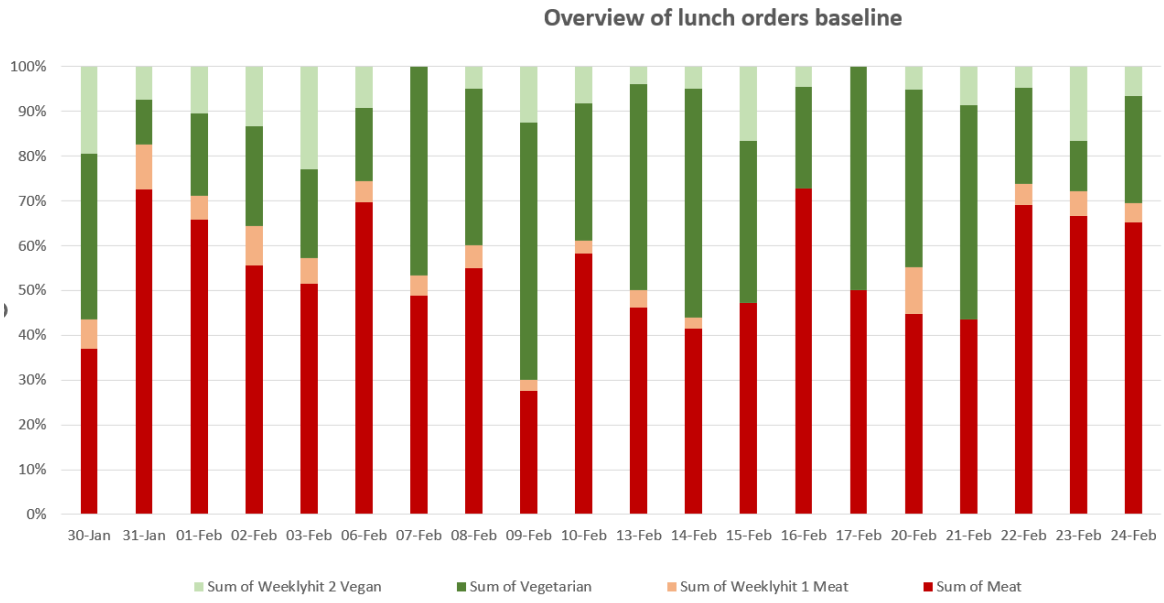

Figure 4-3 Overview of lunch orders baseline

Source: Own illustration

During the intervention period from February 27th to March 10th, 2023, a total of 450 orders were taken during the lunch service form Mondays to Fridays. From the total, 257 orders were made from customers who received the standard menu. Of these 48% were vegetarian or vegan menu orders and 52% were meat orders. 193 orders were made from customers who received a menu containing a social norm statement. Of these, 43% were vegetarian or vegan orders and 57% accounted for meat orders. Figure 4-4 illustrates and directly compares the daily order pattern between the different menus. In Figure 4-4 "intervention" refers to the orders which were placed from customers who received the menus which did contain to social norm statement, whereas "standard" refers to the orders which were placed form customers who received the unchanged menu.

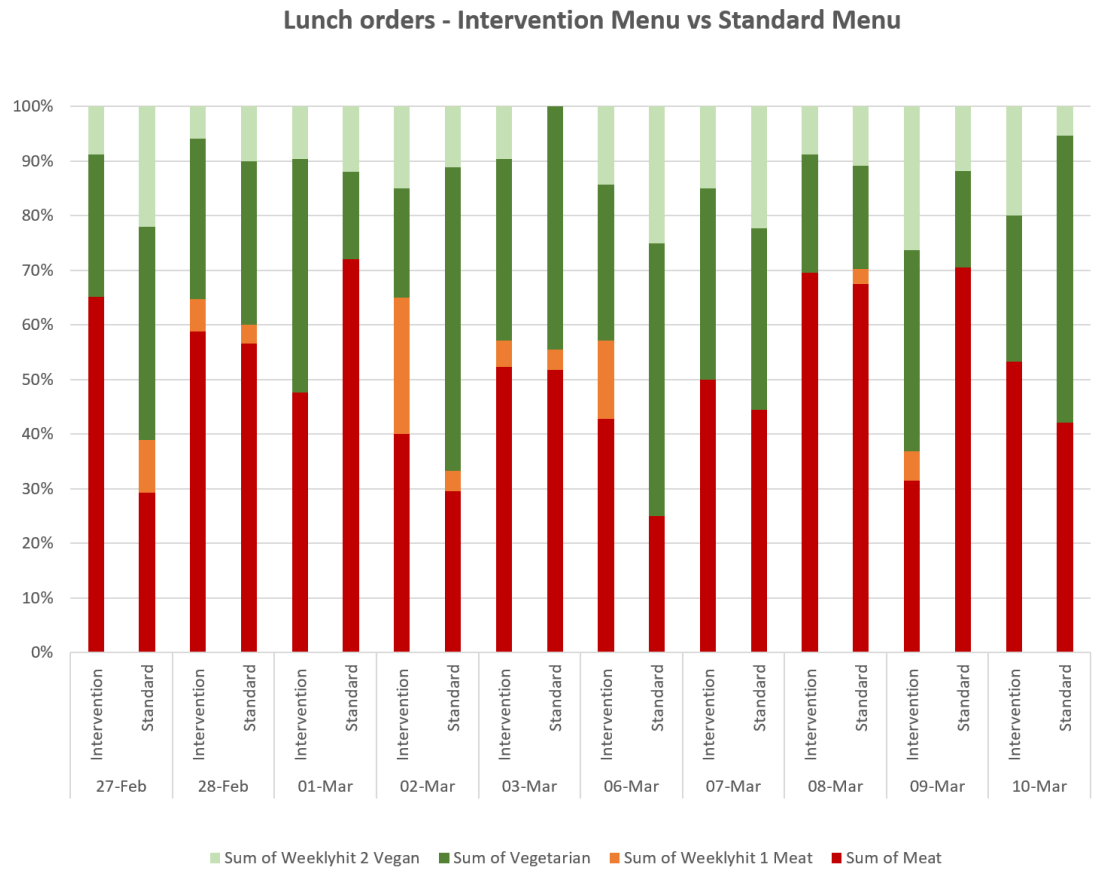

Figure 4-4 Lunch orders - intervention menu vs standard menu

Source: Own illustration

The statistical analysis below in Table 1 and Table 2 show that the intervention menu did not have a significant impact on the placed orders. Table 1 Contingency table – Standard vs Intervention Menu shows the data used to calculate the chi-square comparing the standard menu with the intervention menu. Table 2 Contingency table - Baseline vs Intervention compares the orders between the baseline period and the orders made at the tables which received the intervention menu. Both results show that the intervention menu did not significantly impact the lunch orders.

	Vegetarian Orders	**Meat Orders**	**Marginal row totals**
Standard Menu	123	134	257
Intervention Menu	83	110	193
Marginal column totals	206	244	450 (Grand Total)

Table 1 Contingency table – Standard vs Intervention Menu

Source: Own table

A chi-square test of independence was performed to assess the relationship between the menus and the orders placed during the experiment (see Table 1). The relation was found to be insignificant, the chi-square statistic is 1.05 with a p-value of .31. Thus, the p-value is greater than .05 and therefore not significant. The chi-square value of 1.05 is a measure of the strength of association between the two variables of interest. There is a weak association between the type of menu provided standard vs. intervention menu and the type of order place meat vs. vegetarian option. In other words, the intervention menu has a non-significant impact on the order pattern during the lunch service. There is not enough evidence to conclude that the intervention menu had a significant impact on the lunch orders.

	Vegetarian Orders	**Meat Orders**	**Marginal row totals**
Baseline	296	430	726
Intervention	83	110	193
Marginal column totals	379	540	919 (Grand Total)

Table 2 Contingency table - Baseline vs Intervention

Source: Own table

An additional hi-square test of independence was conducted to evaluate the relationship between the baseline and intervention period with regards to the placed orders (see Table 2). The chi-square statistic is 0.31. The p-value is .58. Thus, the p-value is greater than .05 and therefore not significant. In other words, the conclusion is that there is no statistically significant difference in the type of orders placed between the baseline and intervention periods, and the intervention did not have a significant impact on the type of orders placed.

4.2.2 Online survey

During the intervention study 450 of meals were sold between February 27th and March 10th, 2023. 45 customers completed the online survey, which translates to a response rate of 10%. The detailed results of the online survey can be found in Appendix K – Online Survey Participants Overview and in Appendix L – Online Survey Answers. Overall, 21 female and 24 male customers participated in the survey. No participant who took place in the survey was below the age of 26. An overview of participants and their socio-demographic profiles can be

found in Figure 4-5. The numbers indicated per column indicate the number of individuals per gender, age-group and educational level.

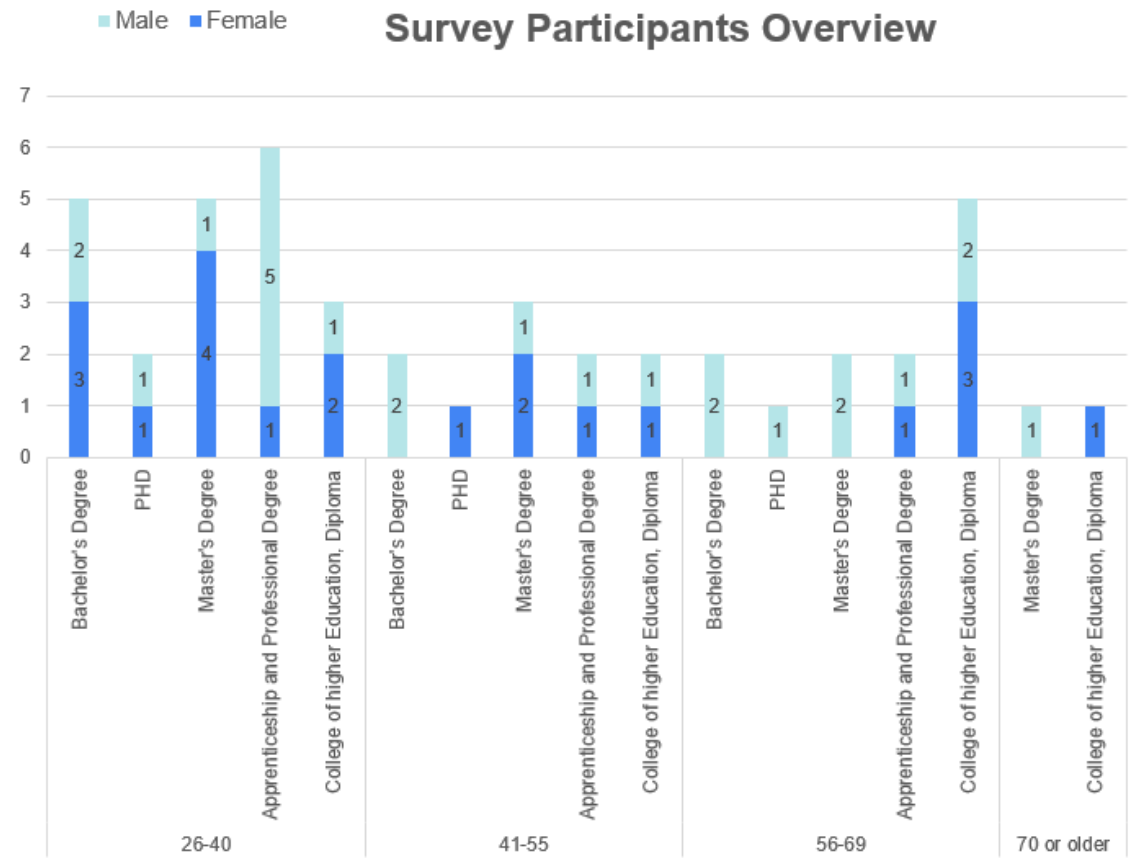

Figure 4-5 Survey Participants

Source: Own illustration

Figure 4-5 shows the difference in participants. Overall, it can be said that the respondents are well educated and that the younger population of the city of Lucerne tends to be underrepresented as none of the respondents is below the age of 26. Nevertheless, considering the population which would choose a sit-down restaurant for lunch, it would most likely be individuals who are working, consequently have a higher disposable income and therefore are more likely to be older than 26 years of age. Thus, for the studied population the responses seem representative of the expected customers.

Figure 4-6 provides an overview of self-reported meat-eating habits by gender. The numbers per column indicated the number of individuals per category. Overall, it can be said that men eat meat more frequently than women. There are three female participants who state to never eat meat, however there is not a single man who claims to never eat meat. Similarly, when it comes to the frequency of meat consumption, there are three women who state to eat meat 4 to 5 times a week or even daily. Looking at the male participants, four men state to eat meat 4 to 5 times a week and another four on a daily basis.

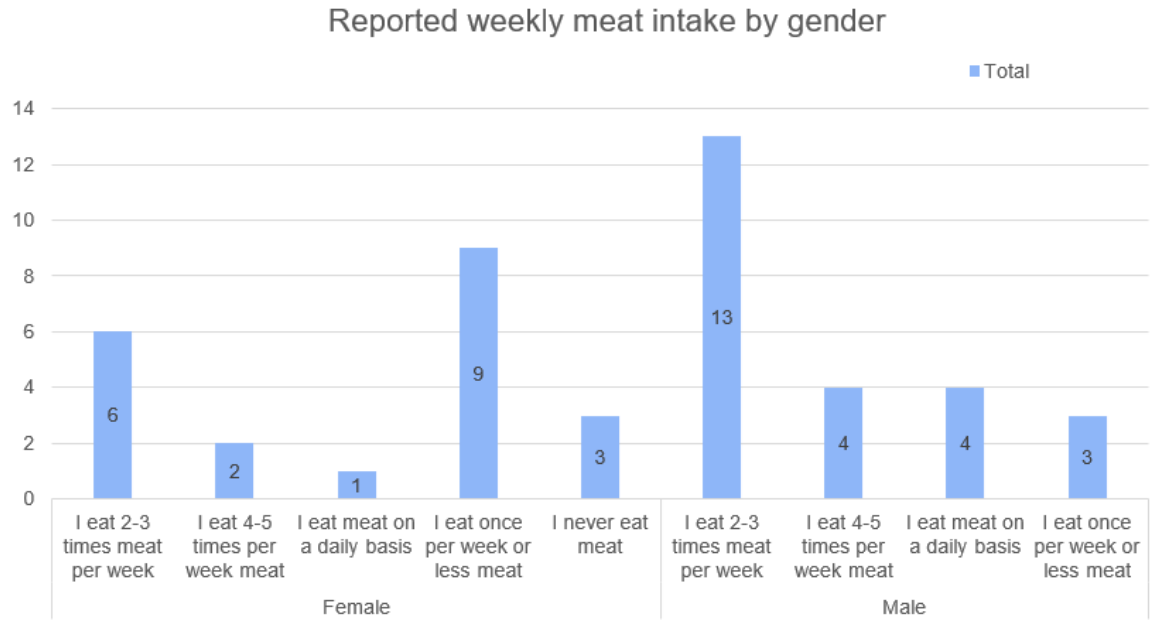

Figure 4-6 Reported weekly meat intake by gender

Source: Own illustration

There appears to be a gap between planned environmentally friendly behaviour and the actual behaviour as indicated in Figure 4-7. In total 28 participants agree to be mindful to behave in an environmentally conscious manner in daily life and 12 participants fully agree to this statement. Solely 4 respondents are neutral, and one respondent does not agree to be generally mindfully to behave in environmentally conscious manner in their daily live. When looking at the awareness of the consequences of meat consumption on the environment, the vast majority seems to be confident in their knowledge. 22 respondents agree and 19 fully agree to be aware of the consequences of meat consumption on the environment. Only 3 respondents are neutral, one fully disagrees, and no one disagrees. When comparing this to Figure 4-7, there seems to be a discrepancy between awareness, the planned behaviour and the actual behaviour. The figure shows, even though people try to behave environmentally conscious and state to be aware of the environmental impact of meat consumption, only four male participants chose a vegetarian menu. The only participants following a vegetarian or vegan diet are female. One female and two male participants who claim to have never considered reducing their meat intake chose a vegetarian option.

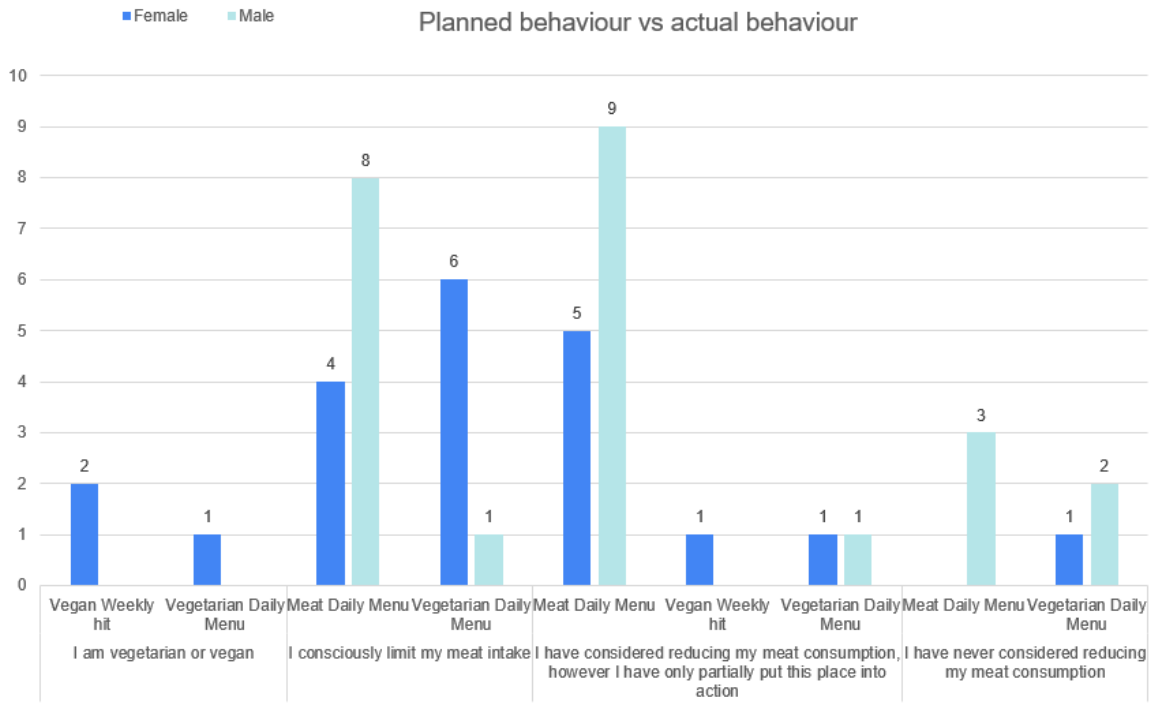

Figure 4-7 Planned vs. actual behaviour

Source: Own illustration

Looking at the economic factors concerning meat intake, there is a trend towards a willingness for higher prices for lunch menus which contain meat, as indicated in Figure 4-8. The blue area indicated the willingness to pay for vegetarian lunch menus. The results show a mean value of CHF 23.40 for a vegetarian menu and a median value of CHF 25.00. Customers are willing to pay more for meat dishes as indicated by the red boxplot on the right-hand side of Figure 4-8. The mean value for a meat dish is CHF 29.40 and a median value of CHF 28.00. The upper price cap for a vegetarian dish is almost where the mean value of the meat dish can be found. Nevertheless, what is important to note is that there are more outliers towards higher prices for the meat dish compared to the vegetarian option, which increases the mean value of the meat option. There might be a higher willingness to pay more for a meat dish. However, this could also mean that customers simply expect the meat-free option to be cheaper than the meat offer.

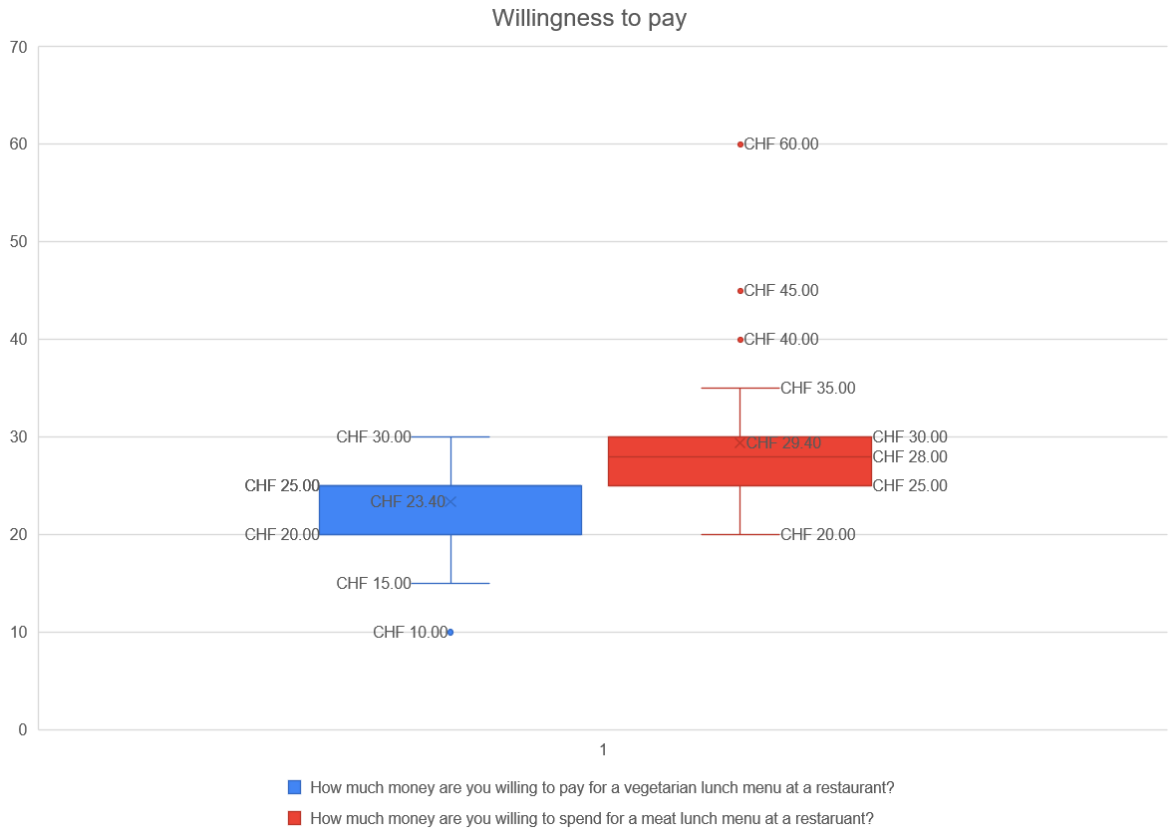

Figure 4-8 Willingness to pay for lunch option in CHF

Source: Own illustration

4.3 Factors influencing local meat consumption

The following section outlines local factors carrying the potential to influence the consumption of meat, based on the data and information gathered through the experts, the intervention or the online survey. Figure 3-2 Model of factors that influence meat-eating behaviour by Stoll-Kleemann & Schmidt (2017) is subsequently used to structure the insights gained from the local situation. Personal factors will be outlined first, followed by socio-cultural, and external factors.

4.3.1 Personal Factors

Knowledge and skills

41 respondents agree or fully agree to be aware of the consequences of meat consumption on the environment. Only four respondents are neutral or disagree about their awareness of the consequences of meat consumption on the environment. The results show a high confidence level about how meat impacts the environment among the respondents. However, the environmental effects of animal products are being clearly underestimated by the Swiss population Kamm et al., (2015) or Schwegler et al. (2015). There is not only an underestimation of environmental effects but also a lack of knowledge concerning the significance of various consumption patterns related to food among the Swiss (Baur et al., 2022; Siegrist et al., 2015; Tobler et al., 2011). The earlier findings by Siegrist et al., (2015) and Tobler et al., (2011) that Swiss consumers severely underestimate the environmental benefits of foregoing meat were reconfirmed by Baur et al. (2022). Buying regional and organic products and avoiding excessive packaging are being considered to have more environmental benefits than avoiding meat (Baur et al., 2022; Siegrist et al., 2015; Tobler et al., 2011).

In addition to the lack of knowledge concerning the environmental impacts of meat consumption, Hagmann et al. (2019) found that the Swiss have an incorrect reference standard when it comes to the understanding of what low meat intake means. The results show that 8 out of 11 respondents who declare to eat meat more than 4 times per week are aware of the consequences of their meat consumption on the environment. And 7 out of the 11 respondents either agree or fully agree to be generally mindful to behave in an environmentally conscious manner in their daily lives.

Values and attitudes

The results from the online survey show that 40 respondents agree or fully agree to be mindful to behave in an environmentally conscious manner in daily life. Solely five respondents are either neutral or do not agree to be generally mindfully to behave in environmentally conscious manner in their daily live. The results show a high willingness to behave in an environmentally friendly manner.

The results of the study conducted in Lucerne by Weibel et al. (2019) show that attitude is one of the factors which has a significant impact on meat consumption behaviour. Attitudes can be influenced through emotion or knowledge-based strategies. Despite the limitations of rational models as indicated by Kollmuss & Agyeman (2002) who do not assign a direct relationship between environmental knowledge and pro-environmental behaviour, attitude was identified as a key factors to change consumer behaviour by Weibel et al. (2019). The attitude to behave environmentally friendly seems to be given, however a lack of knowledge of appropriate measures seems to be a factor hindering changed behaviour.

Emotions and cognitive dissonance

Emotions carry the potential to change attitudes and campaigns working with emotions are particularly effective for people who have not yet considered reducing their meat intake Weibel et al. (2019). Sahakian et al. (2020) describes the debate around 'pro', 'low, and 'no' meat consumption in Switzerland as passionate and that the positive and negative emotions are considered to carry the potential to promote and hinder attempts towards the common understanding of a healthy and sustainable diet. Weibel et al. (2019) assumes that campaigns evoking positive emotions such as the satisfaction of reduced meat consumption or evoking negative emotions including but not limited to guilt for eating meat may be effective for people who have not been actively considering reducing their meat intake.

During the experimentation phase a total of 257 orders were made from customers who received the standard menu. Of these 48% were vegetarian or vegan menu orders and 52% were meat orders. 193 orders were made from customers who received a menu containing a social norm statement. Of these, 43% were vegetarian or vegan orders and 57% accounted for meat orders. As such, the intervention menu has a non-significant impact on the order pattern during the lunch service. There is not enough evidence to conclude that the intervention menu had a statistically significant impact on the lunch orders.

Socio-demographic factors and personality traits

Gender has been found to play a significant role in meat intake decisions and overall women eat much less meat compared to men in Switzerland (Baur et al., 2022; Sych et al., 2019; Tobler et al., 2011; Tschanz et al., 2022).

The findings could be reconfirmed through the online survey results. From the total of 24 male participants only 4 choose a meat-free option. From a total of 21 female respondents, 12 choose a meat-free option. When self-reported weekly meat intake is analysed, it shows that from the

female participants 12 out of 21 claim to never eat meat or eat meat once per week or less. From the 24 male participants only 3 participants claim to eat meat once or less per week, none claims to never eat met.

4.3.2 Socio-cultural Factors

Human behaviour concerning meat is influenced by social norms, roles and relationships, social identities and lifestyle choices as well as cultural and religious traditions (Stoll-Kleemann & Schmidt, 2017). The findings concerning these factors form the local conext will be outlined next.

Social norms, roles and relationships

Stoll-Kleemann & Schmidt (2017) found that social norms are amongst the most relevant factors influencing meat consumption behaviour. Changing social norms particularly concerning the frequency of meat intake in Switzerland was highlighted already some years ago by Kamm et al. (2015). The recent publication of the scientific panel concerning the future of nutrition in Switzerland mentions the need for changed norms and social norms as a key condition towards a more sustainable Swiss food system (Fesenfeld et al., 2023). In the local context of Lucerne, Weibel et al. (2019) found that social norms can be a motivating factors for individuals who have not yet considered reducing their meat intake may think about changing their behaviour. Social reference groups or idols are mentioned by Weibel et al. (2019) as ways to enable social learning through normative communication.

The results of the experiment show that a social norm statement, with a social reference group (the fellow population of the city of Lucerne), in a normative communication style does not necessarily motivate people to choose a meat-free option. Differences in order patterns between the standard and intervention menu are of non-statistical significance. More vegetarian or vegan menus were ordered from customers who did not receive a social norm statement on the menu during the two-week intervention period. From the survey it can be found that 6 respondents choose a vegetarian or vegan menu who either have never considered reducing their meat consumption or have considered reducing their meat consumption but have only partially put this plan into action.

4.3.3 External Factors

External factors which influence individual meat consumption are factors which are found beyond the sociocultural and personal level (Stoll-Kleemann & Schmidt, 2017). Political and economic factors in the local context will be discussed first, before moving on to the food environment which covers attributes of infrastructure, access and products.

Political and economic factors

Lucerne's current climate policy aims to reduce the consumption related emission from the food system through a balanced diet by reducing the emission from the production side. Furthermore, it is acknowledged that reduced animal intake has beneficial impacts on health. Lastly food waste is mentioned as a way to reduce direct and indirect emissions from the food system (Kanton Luzern, 2021). The health care strategy of the canton of Lucerne mentions nutritionists as an important functional group of the health care personnel, however no official link between food, diet and the climate is made (Kanton Luzern, 2015). Health is not explicitly mentioned as part of the climate protection measures but is indicated as a key area for adaptation measures of climate change particularly as a preventative health care measure. The need to inform about particular risks associated with the intensification of heat spells and therefore the need to reduce heat islands in cities are mentioned (Kanton Luzern, 2023a, 2023b).

The city of Lucerne states that from a health perspective, a diet based on the Swiss food pyramid can be considered balanced (Stadt Luzern, 2018). However, the association still recommends 3 portion of dairy products and 1 portion of meat, fish, eggs, tofu or others per day (Schweizerische Gesellschaft für Ernährung, 2023). Jungbluth et al. (2022) have recognized the lack of specification and clearly indicate that for example the one protein rich foods stuff per day should preferably be a plant-based protein and that fish should solely be consumed once per month. Additionally, Teschner et al. (2021) highlights the lack of consistency between the government's dietary guidelines and the broader sustainability policy and its primary focus on human health matters.

The climate and energy strategy of the city of Lucerne addresses health issues related to nutrition solely once and only in connection to educational aspects at schools. The connection to air emissions and health is much more prominently indicated. Emissions from the food system are mentioned but no clear reduction goals are define and their significance is not indicated (Stadt Luzern, 2021). A representative of the information portal for nature, environment and energy issues of the city and canton of Lucerne confirmed that there are no known initiatives targeting consumer behaviour in restaurants (E4). Initiatives in the area of food waste and the food sector in general were known, however they were considered to be loosely connected. The city of Lucerne promotes certain initiatives targeting sustainable consumption and nutrition through its information portal, however tangible statemetns concerning the need to reduce animal products are absent in its official strategy (Stadt Luzern, 2021).

There seems to be a hesitation from local governmental actors to take a more prominent leadership role in driving a change in the food system. A representative from Lucerne's environment and energy department confirmed that given the intense local agricultural activities, food system changes are a delicate topic (E2). Farmers associations are pushing strongly against reforms which aim at lower meat consumption. Interestingly, reduced meat intake would significantelly increase the Swiss food system's as self-sufficiency from 61% to 80% whilst environmental impacts decrease (Zimmermann et al., 2017). However, this fact cannot be found in the local agricultural or environmental policies. Currently, the focus of the environment and energy department lies on food waste and recycling which is considered an end-of-pipe solution by a department's representative. However, an attempt to overhaul the system holistically should be made (E2). No current initiative specifically targeting restaurants to help change consumer behaviour was known to be driven by the local authorities on a cantonal level (E2, E3, E4).

In the Swiss context, monetary considerations of meat prices do not necessarily impact choice to a large extent (Baur et al., 2022; Tobler et al., 2011). Arnaudova et al. (2022) found that meat alternatives need to be appropriately priced for consumers to be perceived as a valid substitute for meat. The survey showed (see Figure 4-8 Willingness to pay for lunch option in CHF) that customers expected the vegetarian dish to be cheaper than the meat dish. This could mean that people value meat or they are not willing to pay more for a vegetarian dish compared to a dish containing meat.

Food environment: infrastructure, access, products

According to Stoll-Kleemann & Schmidt (2017), there is an interrelation between perceived behaviour control and the food environment, as vegetarians find the availability of vegetarian options or a lack of knowledge as less relevant barriers to follow a meat free diet. The results of the study conducted in Lucerne by Weibel et al. (2019) show those who scored highly on perceived behaviour control were relatively more likely to have considered or are already reducing their meat intake. Reducing the perceived difficulty of adhering to a meat-free diet can help strengthen the individual behavioural control and consequently help reduce the perceived

difficulty of reducing personal meat consumption – an applied example are Meat free Mondays (Weibel et al., 2019). Hagmann et al. (2019) found that the perceived difficulty of adhering to a diet with no or low meat intake led to higher meat consumption in Switzerland. Similarly, Schenk et al. (2018) identified convenience as a constraint of utmost importance to explain meat-free diets among the students at the University of Zurich when it comes to making vegetarian food choices.

Previous findings could be confirmed in as far as the results from the experiment show that in the baseline observation, solely the availability of vegetarian and vegan option already lead to an order rate of 48% meat-free meals – thus, either vegetarian or vegan lunch options.

5 Discussion

5.1 Addressing the Research Questions

The aim of this section is to discuss the findings from Chapter 4 in accordance with the initial research questions asked. The findings are compared to previous research and interpreted for the local context of Lucerne.

RQ1: How can local catalysts support a change in consumer behaviour to curb meat intake in out-of-home settings in Lucerne?

The local energy and climate strategy of the canton of Lucerne clearly states that reducing direct emissions from agriculture requires a reduced amount of livestock and as such a curbed meat intake (Kanton Luzern, 2021). However, considering the local context and the identified catalysts for change, a limited activity could be observed concerning initiatives or campaigns to limit meat consumption in the context of Lucerne driven by the government. The number of consulted actors, their respective field of expertise and the questions asked for this thesis within the local context are limited, as indicated previously in section 2.2.3. Thus, there may be other catalysts to help support a change in consumer behaviour in Lucerne.

Knowledge provision and education are the current main policy strategy pillars of the canton and the city of Lucerne. Richter et al. (2023) identified that sustainable diet education and information and prevention campaigns on sustainable and healthy diets to be among the most accepted policy measures. However, these are also among the least coercive. The environmental effects of animal products are being clearly underestimated by the Swiss population as shown by Kamm et al., (2015) or Schwegler et al. (2015). There is not only an underestimation of environmental effects but also a lack of knowledge concerning the significance of various consumption patterns related to food among the Swiss (Baur et al., 2022; Siegrist et al., 2015; Tobler et al., 2011). The answers from the online survey could confirm the discrepancy. The vast majority of respondents stated that they are generally mindful to behave in an environmentally conscious manner and are aware of the consequences of their meat consumption. And yet, 57% of all orders were meat orders. Thus, educational and informational programs and campaigns could be considered to be intensified, strengthened and tailored to specific target groups as suggested by Bacon & Krpan (2018), Kwasny et al. (2022) or Lehner et al. (2016). Funk et al. (2021) and Arnaudova et al. (2022) highlight that strategies and actions to change consumer behaviour should not be too narrow, focussing on one consumer segment as people in one segment will change their attitudes over time. In addition to the consumers another target group for the city and the canton to focus on, should be aspiring chefs, head chefs in training or restaurant owners as currently the majority of meat is consumed in out-of-home settings (Ernstoff et al., 2020; Landert et al., 2021).

Another aspect to target consumers is the health consciousness of the Swiss. Health concerns have been found to be a significant factor in motivating the Swiss to curb their meat intake (Baur et al., 2022; Funk et al., 2021; Götze & Brunner, 2021; Schenk et al., 2018). Local health advocates (E5, E6) have expressed the need for the gastronomy sector to take action concerning healthy food options, which includes meat-free meals. One aspect highlighted by local research is the need to better align environmental, health and agricultural policies (Stolze et al., 2019). The current environmental policy of the canton of Lucerne lacks an explicit interdependency and aligned vision with health policies (Kanton Luzern, 2015, 2021). Thus, the policy lacks alignment on national and regional levels.

In addition to knowledge and health concerns, availability seems to play an important role in consumer choices. Consumers seem to find good alternatives to meat when shopping at retailers

but seem to struggle at restaurants (E3). This is further supported by the fact that the majority of all meat is consumed in out-of-home settings (Ernstoff et al., 2020; Landert et al., 2021). However, the gastronomy sector in Lucerne seems to be too busy with other initiatives (E8).

Currently promoted initiatives from the local governmental and gastronomical sector in the food system particularly concern food waste measures and the need to reduce meat consumption remains mostly unaddressed (E2, E7, E9). However, other catalysts are under the impression that the gastronomy needs to play a more proactive role and ensure the availability of appropriate meat-free options (E5, E6). Schenk et al. (2018) found convenience to be an important factor in a Swiss study amongst students when it comes to making vegetarian food choices. Perceived difficulty in adhering to a low or no meat diet has led to higher meat intake. Thus, the options need to be made available. The results from the intervention show that the availability of a meat-free option itself already lead to more than 40% of all orders irrespective of intervention or baseline were non-meat orders. Consequently, there is hope and the focus should not solely be on how to change existing behaviour but also to identify what is required to remain a high level of vegetarian orders. Changes and communication strategies concerning changed offerings have to be carefully assessed as for example limiting the amount of meat offered in public catering is highly debated and rejected by 12 organizations out of 23, but introducing sustainability standards for public catering solely got rejected by 4 out of 23 organizations (Richter et al., 2023). Public procurement and partially or fully state-owned institutions should be a role model and offer meat-free options, ideally as the default.

Monetary considerations of meat prices do not necessarily impact choice to a large extent in a Swiss context (Baur et al., 2022; Tobler et al., 2011). Arnaudova et al. (2022) found that meat alternatives need to be appropriately priced for consumers to be perceived as a valid substitute for meat. The survey showed that customers in the restaurant expected the vegetarian dish to be cheaper than the meat dish. This could mean that people value meat or they are not willing to pay more for a vegetarian dish. Although price does not seem to be an important factor, there is an expectation that a vegetarian meal ought to be cheaper than a meat dish. This is in accordance with Fesenfeld et al. (2023) who state that the true cost of should be reflected in the price of a product, which makes animal products more expensive. The gastronomical sector could help ensure that the different options are priced appropriately so that meat options become financially less attractive.

RQ2: How does a social norm message influence actual consumer behaviour in a restaurant in Lucerne?

Presenting consumers with messages containing environmental content has yielded different results. In an online survey by Blondin et al. (2022) a social norm statement lead to almost double the amount of vegetarian dishes compared to the control group. On the other hand, Çoker et al. (2022) could not produce any evidence for the effectiveness of a descriptive social norm statement in a UK retail chain's restaurants. And Sparkman et al. (2020) even found dynamic norms on restaurant menus leading to fewer vegetarian orders during dinner service, when more affluent customers were present.

The results of the experiment show that presenting customers with a social norm statement during lunch did not lead to a statistically significant difference in order patterns compared to the standard menu. Interestingly, the overall number of meat-free orders meaning vegetarian and vegan menus was higher during the two-week intervention period compared to the baseline. A possible explanation or a factor which may have influenced consumers is the fact that the local carnival just ended four days before the start of the intervention. There may have been a general desire to eat more healthily after the festivities and limit the meat intake.

The results by Sparkman et al. (2020) and Çoker et al. (2022) can therefore be confirmed in as far as that a social norm statement does not necessarily lead a significant change in consumer behaviour and may even backfire (Bacon & Krpan, 2018; Lehner et al., 2016). However, during this thesis no data was gathered concerning income levels among the customers. Thus, a generalization as it was done by Sparkman et al. (2020) that more affluent consumers tend to choose not adhering to the indicated social norm cannot be made. Nevertheless, it can be assumed that people who are going for lunch in a restaurant on a weekday may have either more disposable income available or value the experience so much that they are willing to pay for the provided services.

The study could provide insights into a real-life situation where interventions target social norms. The lack of such insight has been frequently mentioned (Kamm et al., 2015; Kwasny et al., 2022; Weibel et al., 2019) and the results show that it is worthwhile to conduct real-life experiments to assess an intervention before broadly implementing it. A social norm statement may indeed not be the most effective instrument in motivating consumers to change their behaviour and other intervention strategies may proof to be more effective tools to complement the policy mix. Nevertheless, the city could help assist in defining new social norms through a collaboration with local people of importance or strong influence. As indicated in section 2.4.2 and 2.3.3 conducting real-world experiment presents itself with various challenges and limitations. As the studied sample solely represents the customers for a limited period during the lunch service in the city, the findings cannot be generalized for the city, the canton or the entire nation.

The results from the experiment could further shed light on the importance of the availability of meat-free options. Even though Baur et al. (2022) found that people attribute more weight to the constraints of their personal resources of know-how, time and money than the availability of options including vegetarian menus in restaurants to make environmentally friendly food choices, the sales data reiterate the importance of availability. The orders show that irrespective of the presence of a social norm statement, the share of meat-free dishes is above 40%. As indicated by (Weibel et al. (2019), the aim should be to increase the perceived behavioural control through reducing the perceived difficulty of adhering to a meat-free diet. Strengthening the individual behavioural control for example through making vegetarian food choices more convenient can help reduce the perceived difficulty of reducing personal meat consumption and consequently help reduce meat consumption levels (Schenk et al. (2018).

Previous studies in Switzerland have shown that Swiss men follow a less healthy diet and consume much more meat compared to women (Baur et al., 2022; Schmid et al., 2017; Sych et al., 2019; Tobler et al., 2011; Tschanz et al., 2022). The findings from previous research could once again be confirmed by the findings of the online survey. During the intervention solely the sales data were collected per table and no further data including socio-demographic information was accumulated. However, the online survey confirmed that women eat meat less frequently than men and ordered less meat menus compared to male customers. As such, customised interventions for different target groups need to be identified.

The results from the local experiment show that there is no such thing as a short cut to changing social norms and that the applied policy strategy of knowledge and information provision has not been yielding the desired results. Lucerne's city government stated that regulations for the promotion of a specific diet may be perceived as paternalism by the inhabitants (Stadt Luzern, 2018). On a national level the meat lobby argues for free choice (Sahakian et al., 2020). However, free choice should come with perfect information for the consumers. Previous studies and the results of the experiment have shown the poor understanding of the Swiss population when it comes to the most effective food choices to reduce environmental degradation. Improved

knowledge and the availability of meat-free options seem a crucial first step to help change the norm of meat intake in Switzerland.

5.2 Reflections and Limitations

5.2.1 Methodological, theoretical and analytical choices

The chosen framework by Stoll-Kleemann & Schmidt (2017) helped identify factors which influence meat-eating behaviour. The framework helped both in structuring the work and assisted in identifying further sources. Nevertheless, there are numerous other theories and models, which aim to explain how human behaviour can be influenced (Jackson, 2005). Such other theories and models were considered, and the one by Stoll-Kleemann & Schmidt (2017) seemed most appropriate in understanding meat consumption behaviour in the region of Lucerne. Thus, future research may be using another model or framework to better understand local consumer behaviour or test the framework through other variables. Alternatively, future research findings could be used to complement existing models.

5.2.2 Legitimacy and relevance of research

Over forty researchers from leading Swiss institutions published the guide "pathways to Switzerland's food future" in early 2023 (Fesenfeld et al., 2023). It is the first time that an interdisciplinary scientific process was applied to create a comprehensive action path to reorient the Swiss food system in line with the Sustainable Development goals. Thus, this shows that there is great local interest in better understanding how we can better the food system.

This thesis applied a particularly strong focus on consumers within the system. Previous research in the field showed that there is a lack of understanding and experimentation concerning different interventions in the real world. Social norms were found to be worthwhile investigating in more depth. This thesis aimed to shed light on how a social norm message influences actual consumer behaviour in a restaurant in Lucerne and how local catalysts can support a change in consumer behaviour to curb meat intake in out-of-home settings in Lucerne.

5.2.3 Limitations of Reliability, Validity and Generalisability

The results gained through the intervention and the online survey solely reflect the behaviour of guests in one particular restaurant during a two-week period in early 2023. Thus, generalizations of the results for the broader population or entire city of Lucerne are not necessarily feasible – the Research Design, Materials and Methods section provided an overview of the limitations according to the research phases. Nevertheless, when incorporating results from previous research, policies and expert input a more detailed picture of potential strategies to curb meat consumption in the context of Lucerne can be drawn. Additionally, previous research has shown that different language regions within Switzerland present different local consumption patterns (Schmid et al., 2017; Sych et al., 2019; Tobler et al., 2011). Thus, tailored approaches need to be taken to address local customs.

The relatively short timeframe of the experiment needs to be considered for future research. Longer baseline and intervention periods would be valuable in generating more robust results. Both the baseline and intervention could be carried out during different seasons of the year, and in restaurants attracting different consumer segments. Furthermore, experiments in different language regions could be considered for the Swiss context. The research at present does not necessarily carry the potential for generalizations of the gained insights, however it could provide a basis to test the results in other cities or regions within Switzerland or even abroad. Nevertheless, the study helps in better understanding how consumers behave in the real world

and what could be potential measures in the gastronomy sector to steer consumers towards more sustainable choices. Social norms may require more time to form and as such a social norm statement may not be the most appropriate intervention strategy for a particular target group.

A major limitation of this study is the focus on consumers and their direct interaction with one particular catalyst within the food system – restaurants. The consumer is solely one actor within the food system. A key stakeholder group which has not been considered in this thesis are the farmers and producers. When introducing policies, it is important to consult with all stakeholders and develop strategies for the future together as currently 80% of the value generated in agriculture in Lucerne comes from animal products (Kanton Luzern, 2017). Considering the entire Swiss food system and not solely the case of Lucerne, another important factor which has not been covered but may be interesting to consider when developing communication or long-term food security strategies is the fact that the level of self-sufficiency of the Swiss food system can be increased by almost 20% through reduced meat consumption (Zimmermann et al., 2017).

The Swiss severely underestimate the environmental benefits of a vegetarian diet the Swiss believe that regional and organic product choices yield the highest environmental benefits (Baur et al., 2022; Siegrist et al., 2015; Tobler et al., 2011). The provided menus included the following declaration on the bottom, irrespective of whether the social norm statement was present or not "*Unser Fleisch und Fisch stamen ausschliesslich aus der Schweiz und warden über regionale Lieferanten bezogen. Beim Kauf von Gemüse, Obst, Käse, Eiern und Brot achten wir auf saisonale, regionale und teilweise biologische Produkte.*" (Translated by the author: "*our meat and fish are exclusively sourced from regional suppliers. We look for seasonal, regional and partly organic products when procuring vegetables, fruit, cheese, eggs and bread.*"). Thus, the misconception of the general public may have been reinforced by the declaration of product origin by the restaurant.

Data was gathered in a mixed methods design, consisting of both quantitative and qualitative data points. This leads to a major potential limitation in terms of validity when the sample of the qualitative phase is used in the quantitative phase as it would introduce a duplication of responses (Creswell & Creswell, 2018). There is certainly a possibility that a customer at the restaurant may have participated in one of the surveys concerning meat consumption conducted in Switzerland. Nevertheless, the exact same sample can be excluded as the intervention targeted customers of a specific restaurant during a specific time of the day. Furthermore, no previous study – to the knowledge of the author – has been conducted in the area of Lucerne which investigated the impact of social norms on actual consumer behaviour in a restaurant.

6 Recommendations and Conclusions

The current Swiss food system is not sustainable and actions from various actors within the system are required. The primary focus of this thesis has been the consumers and one particular intersection within the system where supply meets demand – restaurants.

Previous research findings have been confirmed - the majority of the Swiss population aims to behave in an environmentally friendly way. The current local policy states that information provision and knowledge are the primary tools used to shift consumer behaviour towards more sustainable choices – including reduced meat consumption. However, the currently applied interventions do not seem to yield the desired results in terms of changed consumer behaviour and thus further policy interventions are required to synergistically curb GHG emissions from the Swiss food system. Approximately 90% of the Swiss eat meat and the consumers are not necessarily in the position to assess the environmental impacts of different food choices. As such, there is room for improvement to better educate the population and strengthen information and knowledge provision measures. There is great potential as these are widely as the majority of the population would like to behave in an environmentally friendly way. The focus of efforts should first lie on the 75 to 85% of meat eaters who already considered or have reduced their meat intake. Increasing the availability of meat-free options and improving knowledge about the environmental effects of different food choices are widely accepted policy measures and should be prioritised. As policy interventions become ever more stringent, the remaining heavy meat eaters can be targeted at a later stage, once a new social norm has been established which entails less frequent meat intake.

The target audience of this thesis is policy makers, individuals or groups involved in the policy process, as well as gastronomical institutions, tourism associations or individual restaurants which are interested to positively impact climate change through reduced meat consumption. Furthermore, climate change-, consumer behaviour- as well as public health professionals may be interested in these findings as the two challenges (climate and public health) are closely connected through people's diets. The provided recommendations are for the short to mid-term and these are immediate actions, particularly targeting the diet and as such the mediating piece between demand and supply for food. The supply side of the food system namely farmers and producers are key stakeholders in the transformation of the food system. Alternative income to animal products, particularly for the region of Lucerne need to be developed. However, producers been excluded from the analysis due to time and scope constraints.

Individual consumers

The willingness of the Swiss population to behave in an environmentally friendly way is high and the society would like to take actions to do good. Over three-quarters of the population aims to limit their meat intake, and hence there is great potential to normalize reduced meat intake. An important fact to reinforce is that consumers carry a tremendous amount of power with them. In the Swiss food system, direct consumer choices have the potential to impact approximately 80% of the system's GHG emissions. With power comes responsibility and thus educating the public and providing meat free options to choose from provide cornerstones to change the behaviour of the masses.

A widely accepted policy is raising awareness and educating people about the consequences of their consumption behaviour. The population has not necessarily understood that meat and particularly beef and pork are much worse for the environment compared to vegetables, irrespective of whether these are wrapped in a plastic foil or not. The understanding is that local and seasonal is the best one can do. However, this understanding is wrong and scientific evidence has been available for over a decade. Knowledge is an important first step so one

knows what to do. As demand drives supply, the more local non-meat options are in demand the more likely it is that these will be produced. Immediate actions which can be taken include, ordering the vegetarian option when eating for lunch with colleagues, or preparing a meat free meal when inviting friends helping to normalise non-meat meals as tasty and complete dishes to support the establishment of a new social norm.

Tackling the issue of high meat intake from various angles targeting policy measures to specific consumer groups based on socio-demographic characteristics is important. However, attitudes change and thus the interventions need to be adjusted over time. There is no single silver bullet to curb meat consumption and thus the orchestration of efforts is essential. Public health professionals, the city council and policy makers as well as gastronomical institutions, restaurants and the tourism sector have a role to play in the context of Lucerne.

Public Health Professionals

Meat is more often foregone for health concerns rather than environmental considerations in the Swiss context. This is not necessarily a bad thing as there is an overlap of a healthy and sustainable diet. A sustainable diet tends to be healthy. Thus, public health and environmental policies would greatly benefit from one another if better aligned as one could support the other. Closer exchange between public health and environmental protection experts and policy makers could yield benefits in the form of for example updated consumer recommendations or procurement decisions which incorporate health and environmental aspects. The population is motivated to take more environmentally conscious decisions and is eager to eat healthily. Thus, there lies great potential for public health professionals to support the transition towards healthier and more sustainable diets in Switzerland.

City of Lucerne & Policy Makers

The city council was afraid to paternalize the public by telling them which diet to follow and therefore solely accepted a counterproposal to the sustainable and fair food initiative submitted in 2016. However, residents may have been paternalized into consuming meat although they are motivated to take more environmentally friendly choices. Lacking proper education and the availability of healthier and more environmentally friendly options are two reasons for undesirable choices. As such more proactivity and support are required from the city council of Lucerne towards libertarian paternalism to improve food related decision-making - reduced meat consumption. Sustainable diet education and information as well as prevention campaigns on sustainable and healthy diets are a highly approved reduction intervention by the Swiss public. Additionally, sustainability standards for public catering receive high approval rates and could be further nurtured by the city council.

In addition to further bundle the efforts of public health professionals and environmental interests, the aspect of agriculture needs to be considered particularly in the region of Lucerne where extensive livestock farming is exercised, and the majority of the agricultural production value is generated through animal products. The human diet is where food supply from agriculture meets with consumer demand. There is great potential to benefit from the motivation of the Swiss wanting to follow a healthy diet and live environmentally conscious lives. A healthy diet can easily be a sustainable diet – by better aligning health, environmental and agricultural policies, benefits for all actors in the food system could be realized. Although not explicitly identified as a major driver to change meat consumption in Switzerland on an individual consumer level, financial structures and incentives for the agricultural sector and meat industry need to be reconsidered. From a direct consumer perspective this includes adequately pricing vegetarian options. The city could help ensure the adherence to appropriate menu pricing and redirecting financial incentives and investments to move agricultural value generation away from animal products. More short-term efforts by the city could include other

strategies in addition to end-of pipe solutions in the form of food waste reduction actions and better coordinate the different already ongoing initiatives concerning food consumption. Food waste is certainly important, but one cannot change the system by focusing on food waste alone. We have to change what is being produced and consumed, thus a change in diet is needed. In the short term there are three areas of interest for the city, all of which should be coordinated with one another and driven to accomplish the shared goal of a more sustainable food system through improved dietary choices.

Firstly, the city of Lucerne should aim to improve the level of education concerning the environmental impact of its residents' food choices. People are motivated to change and 75% of the city's population has already started to reduce their meat intake, but they lack the knowledge to take the most effective measures. Knowledge about environmental effects of meat consumption seems to be poor and the information and knowledge provision needs to be improved, continuously evaluated and amended accordingly. Target group specific information campaigns should be designed to further their effectiveness. The current focus is on local and seasonal products, which are important aspects to reduce the environmental impact of the food system. Nevertheless, the reduction of animal products remains the single most effective way to help stabilize the earth system. As such simply referring to the Swiss food pyramid seems insufficient as a more nuanced guidance is needed for the population to know what a healthy and environmentally friendly diet entails.

Secondly, increasing availability of vegetarian options is crucial. This can be achieved by introducing vegetarian days at various institutions and should be supported by the city and the canton in its fully or partially owned institutions. Public procurement also has a responsibility to prioritize vegetarian options, when assigning contracts with vendors. This approach can help address habitual and perceived behavioural control factors, as research has shown that the mere availability of vegetarian options makes it easier for people to choose them. Currently, consumers are sometimes encouraged to choose meat, so a shift towards making the default option the vegetarian one is necessary. As most meat is sold through out-of-home establishments and the lacking priority to reduce meat by the gastronomical sector, the city may consider establishing a point of contact and actively support restaurants in their journey to reduce meat consumption through the education of practitioners, creating incentives for changed menus or other measures to support the restaurants.

Lastly the city should aim to introduce new social norms. Overall, the social norm needs to be changed in terms of how much meat and animal products is consumed. By educating people, making vegetarian option easily accessible and the 75% of the city's population who have already considered or have already reduced their meat intake are further supported and can help establish a new social norm. To further support the introduction of a new social norm, the city should act as a role model and could consider working with local chefs, celebrities or other influential personalities. By adopting a proactive and supportive approach, the city council of Lucerne can contribute to improving decision-making in the context of reduced meat consumption, while still upholding the principles of libertarian paternalism.

Gastronomical institutions, restaurants, tourism

Similar to what the consumers need to know about the GHG footprint of their food choices, it is crucial to spread the knowledge among all actors within the food system, particularly amongst chefs and owners as they decide what is going to be on offer and thus serve to the customers. Regional and local products and aiming to reduce food waste are important first steps. Reduced meat intake levels show to have the most impact to reduce GHG emissions from the Swiss food system. Currently most of the red meat is sold through the gastronomical sector and thus there

lies great potential for change. Three specific aspects could be considered by gastronomy sector, which can help motivate people to order meat-free dishes.

Firstly, availability has proven to be an important factor when choosing vegetarian options over dishes containing meat. Availability is closely linked to perceived behavioural control – when vegetarian dishes are available or even better found as the default it is much easier for consumers to choose a vegetarian option. When providing both meat and vegetarian options, incorporating the true cost of a meal could be considered, resulting in a tendency towards cheaper vegetarian options.

Secondly, taste and habits have shown to impact consumer behaviour considerably. Restaurants with its trained chefs are in a position to show people what a tasty vegetarian dish can look like, and that meat is not a necessary component of a complete meal. Innovative restaurants and food establishments have an opportunity to be pioneers and first movers in providing tasty, healthy and environmentally friendly dishes.

Lastly, creating new social norms by teaming up within the sector through the help of the city as a facilitator could be considered. Currently the tourism sector primarily focuses on food waste, as well as regional and seasonal components which are all part of the equation towards a more sustainable food system. However, emission reductions are particularly significant at the production stage as this is the most emitting stage. Meat shows particularly high emission levels at the production stage and a way cut these emissions is by reducing meat consumption. Thus, the tourism sector itself plays an important role in normalizing vegetarian options, advertising regional and seasonal meat-free dishes. This could include the introduction of a Gastro collaboration Charta, similar to the one in Zurich.

Conclusions

Not all policy interventions to curb meat consumption are currently accepted and awareness, knowledge and understanding of the general population need to be increased before more stringent measures can and must be taken. People have to be further educated, social norms need to change, and vegetarian options need to be easily accessible. An orchestrated policy mix including agricultural, health and environmental aspects is required to transform the Swiss food system. 75 to 85% of the Swiss population has considered or has already reduced their meat intake. As the population becomes ever more aware of the environmental impact of their food choices, increasing availability of meat-free options and the generally high willingness to take more environmentally friendly choices, policy coerciveness can be increased over time. Actions need to be taken from all actors within the system to help individual consumers develop new social norms where reduced meat intake is normalised. Public health professionals, the city council and policy makers as well as the gastronomical and tourism sector should adopt a more proactive and supportive approach to help consumers follow healthier and more environmentally friendly diets. Although, the Swiss cow is a symbol of cultural heritage and Swiss traditions, which some organisations and individuals want to protect, reducing meat intake helps Switzerland's food system to become more self-sufficient, less reliant on food imports and thus become more resilient towards external shocks and as such more Swiss.

Opportunities for further research are plentiful and include more in-depth interviews with different local actors to better understand barriers and opportunities for change, conducting more experiments in other cities, language regions, during other seasons of the year or for longer time periods. Furthermore, better understanding the different consumer segments seems important when designing interventions or communication strategies for the public. Moreover, conducting research and experiments targeting other factors than socio-cultural factor could be interesting to provide more nuanced suggestions for an optimised local policy mix. Lastly,

expanding the focus of the considered catalysts could be another avenue for future research as this thesis primarily looks at the individual and their meat consumption behaviour in out-of-home settings.

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Appendix A – Lucerne and Zurich compared

A key assumption of this study is that meat consumption patterns in Lucerne and Zurich are comparable, and a high proportion of beef and pork is consumed out-of-home. As indicated in Chapter 1, restaurants sell over 60% of all the beef sold in the city of Zurich. The justification for the assumption is that both cities are located in the German speaking part of Switzerland and that the demographics are comparable as in both cities the majority of inhabitants are Swiss, followed by Germans and Italians and the amount of foreigners make up a similar percentage, approximately 32% in Zurich and almost 25% in Luzern in 2021 (LUSTAT, 2022b, 2022a; Stadt Zürich, 2022, 2023). Further socio-demographic variables which are similar between Zurich and Lucerne and thus justify a key assumption are indicated in the Tables below. Table 3 compares the different educational levels between the city of Lucerne and Zurich. The comparison shows that there is a higher proportion of people with a tertiary education in Zurich compared to Lucerne.

Education Level	Lucerne	Zurich
Mandatory School	15%	16%
High School	37%	28%
Tertiary Education	48%	56%

Table 3 Education levels compared between Lucerne and Zurich (year of comparison 2020)

Source: Statistik Luzern, 2022; Statistik Stadt Zürich, 2023

The age ranges between the two cities are shown in Table 4 Age comparison Lucerne and Zurich (year of comparison 2021)

. It can be said that the distribution of age is comparable between the city Lucerne and the city of Zurich with a tendency towards younger inhabitants in Zurich. Overall, in can be said that Zurich tends to consist of a younger, more international and better educated population compared to Lucerne. Nevertheless, given the fact that both cities are located in the German speaking part of Switzerland and their relative proximity as shown in Figure 0-1 Map of Switzerland – modified for illustrative purposes, the assumption can be made that consumption patterns are comparable. As previous research has shown, there may be a tendency for people with higher education levels to eat less meat. If there is a difference between the Zurich and Lucerne, it may be that proportionally more meat is consumed in Lucerne compared to Zurich.

Age Range	Lucerne	Zurich
0-19	16%	17%
20-29	14%	16%
30-39	18%	21%
40-49	13%	15%

50-59	13%	12%
60-69	10%	8%
70+	16%	11%

Table 4 Age comparison Lucerne and Zurich (year of comparison 2021)

Source: Statistik Luzern, 2021; Statistik Stadt Zürich, 2021

Figure 0-1 Map of Switzerland – modified for illustrative purposes shows the geographical proximity of Lucerne and Zurich. Both cities are located in the German speaking part of Switzerland and are located next to a lake. The biggest difference between the two cities is the number of inhabitants. Lucerne has a population of approximately 83,000 people, of which 52% are women and 48% are men (Statistik Luzern, 2021). Contrarily, Zurich has a population of approximately 436,000 people of which 50% are women and 50% are men. To the North of Switzerland is Germany, to the South Italy, to the west France and to the east Liechtenstein and Austria. The reason why it is important to note the neighbouring countries is their influence on local culture and food consumption habits within Switzerland. The differences in consumption behaviour among the different language regions will be further elaborated upon in the following chapter.

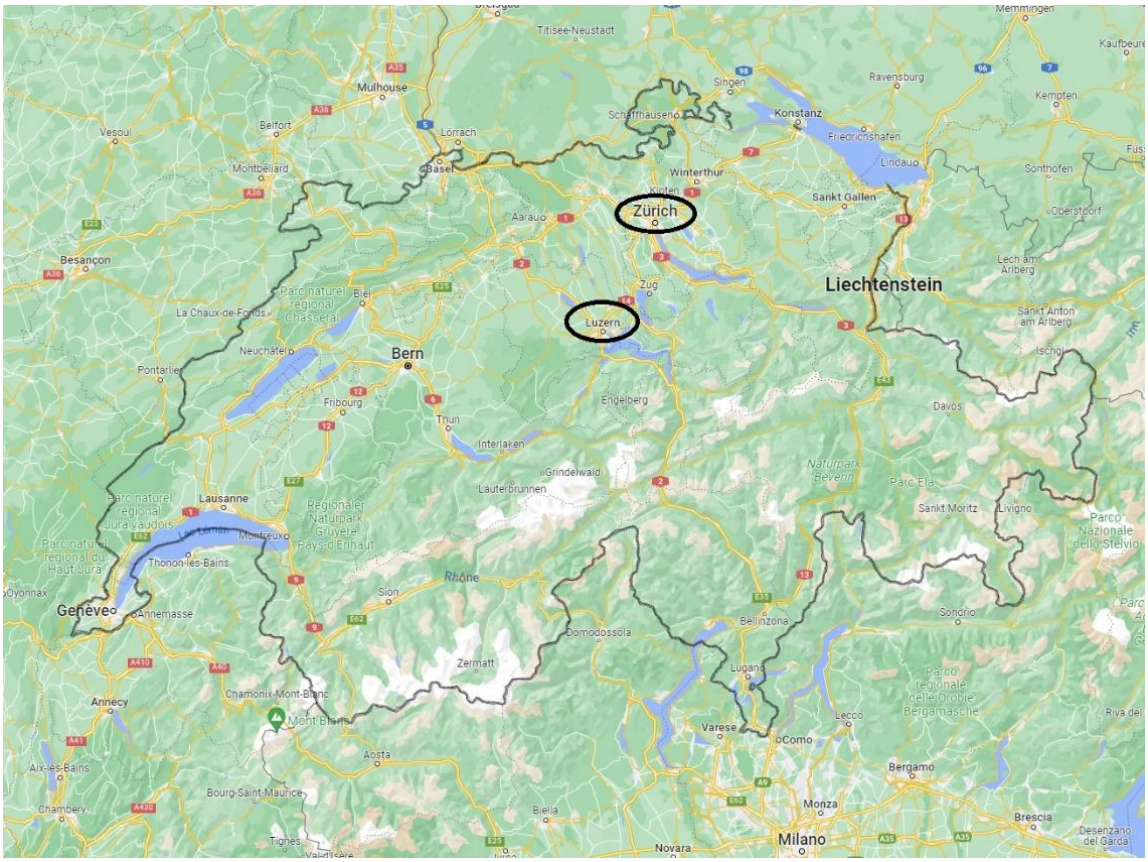


Figure 0-1 Map of Switzerland – modified for illustrative purposes

Source: Google Maps, bold circles and border added for illustrative purposes by the author

Appendix B – Overview of intervention at Restaurant

The Restaurant has indicated that the final interventions need to be communicated on the Wednesday prior to the start of the experiment period. An experiment period would always be a Monday as this is the day the new weekly menu is being published. The time between Wednesday and Monday is used by the staff of the restaurant to order the required food items, initiate the corresponding preparations in the kitchen and brief the staff accordingly. Additionally, this provides enough time to prepare the printed menu accordingly to the selected dishes.

In order to develop an appropriate intervention strategy for the timeframe of 27 February to 10 March, the restaurant was provided with the below intervention possibilities on January 19th, 2023. The overview aimed at providing the restaurant with a set of potential interventions, which can be assessed for their feasibility by the restaurant manager and the leading staff. The experiment should not negatively impact the business both from a short- and long-term perspective. Accordingly, the restaurant was provided full insight and decision power concerning the possibility of testing the interventions.

The following overview has been based on previous research which aimed at better understanding strategies to reduce meat consumption and has been described in Chapter 2.

On January 24th, 2023, the restaurant confirmed that the following interventions strategies targeting could be tested during a one or two week period: information provision targeting knowledge and skills, attitude and values and social norms. Furthermore, changes to the visibility, and amount of meat (except for a piece of meat) could be considered for testing. Consequently, these strategies were further investigated, and appropriate interventions developed.

List of proposed interventions:

Focal Factor Targeted by Intervention: Personal Factors

Specific Target Factor: Knowledge and Skills

Intervention Strategy: Information

Examples: The impact of food on the environment, the impact of meat on the environment, der impact of food on health, the impact of meat on health, information concerning animal welfare, labels or graphs concerning environmental impacts of specific foods or ingredients, labels or graphs concerning health impacts

Translation: Informationen: der Einfluss der Ernährung auf die Umwelt, der Einfluss von Fleisch auf die Umwelt, der Einfluss der Ernährung auf die Gesundheit, der Einfluss von Fleisch auf die Gesundheit, Informationen zum Tierwohl, Labels oder Grafiken zum Umwelteinfluss bestimmter Gerichte oder Nahrungsmitteln/Zutaten, Labes oder Grafiken zum Gesundheitseinfluss

Focal Factor Targeted by Intervention: Personal Factors

Specific Target Factor: Emotions and Cognitive Dissonance

Intervention Strategy: Pictures

Examples: cute pictures of animals on the menu or distribute cute pictures of animals prior to the meal choice, add disgusting pictures of animals on the menu or distribute such pictures prior to the food choice

Translation: herzige Bilder von Tieren auf das Menü nehmen oder vorher aushändigen, abstossende Bilder von Tieren aufs Menü nehmen oder vorher aushändigen

Focal Factor Targeted by Intervention: Personal Factors

Specific Target Factor: Emotions and Cognitive Dissonance

Intervention Strategy: Emotional Messaging

Examples: provide messages which aim at empathy with animals, provide messages which aim at guilt of customers, provide moral messages or alternatively, provide messages which trigger positive emotions

Translation: Nachrichten bezogen auf die Empathie mit Tieren, Nachrichten die auf Schuldgefühle abzielen, moralische Nachrichten einfügen, oder Nachrichten die positive Emotionen auslösen

Focal Factor Targeted by Intervention: Personal Factors

Specific Target Factor: Values and Attitudes

Intervention Strategy: Informational message

Examples: messages appealing to the the effort we can make as a nation (e.g. if as a country we reduce our meat intake to XY grams per day we can reduce Switzerland's carbon emissions by XY% - together we can make a difference. Or alternatively, appealing to to self-enhancement value (if you reduce your meat intake by XY grams per day, this will reduce your carbon emissions by XY% - you can make a difference)

Translation: Nachrichten welche das Potential als Nation anspeilen (zum beispiel, falls wir als land unseren Fleischkonusm um XY Gramm reduzieren, kann die Schweiz ihre Treibhausgasaustoss um XY% verrigern – zusammen können wir etwas bewirken. Oder alternative, auf die Selbstoptimierung anspielen – Falls Sie Ihren Felischkonsum um XY Gramm pro Tag reduzieren, können Sie Ihren Treibhausgas Emissionen um XY% verringern – du kannst einen Unterschied machen)

Focal Factor Targeted by Intervention: Socio-cultural Factors

Specific Target Factor: Social Norms

Intervention Strategy: Information / Messaging

Examples: Messages on the menu which state "30% of the Swiss population eats vegetarian twice a week due to environmental reasons" (this percentage is made up), or that "20% of the Swiss population eats vegetarian three days per week due to health reasons", or alternatively incorporating statements of famous people who identify as vegetarians or vegans.

Translation: Nachrichten auf dem Menü das beispielsweise sagt "30% der schweizer Bevölkerung isst der Umwelt zu liebe an 2 Tagen pro Woche vegetarisch" (das ist frei erfunden), oder "20% der schweizer Bevölkerung isst aus Gesundheitlichen Gründen an mehr als drei Tagen pro Woche vegetarisch", oder das Einfügen einer bekannten Persönlichkeit die sich zum Vegetarismus/Veganismus bekennt,

Focal Factor Targeted by Intervention: Socio-cultural Factors

Specific Target Factor: Culture and Religion

Intervention Strategy: Information / Messaging

Examples: Target religious or cultural aspects of meat consumption

Translation: Auf religiöse oder kulturelle Aspekte bezügliche des Fleischkonsums ansetzen

Focal Factor Targeted by Intervention: External Factors

Specific Target Factor: Political and Economic Factors

Intervention Strategy: Price

Examples: an option would be to increase the price of meat dishes, the true costs could be incorporated so that negative externalities are part of the price, such as CO2 emissions or biodiversity loss which are currently not part of the price, this could also be an option to pay (hence not a mandatory price but an option), alternatively an imaginary meat tax could be declared on the menu.

Translation: Beispielsweise die Fleischgerichte verteuern, die "true cost" einberechnen also die negativen Externalitäten welche nicht im Fleisch Preis eingerechnet werden (CO2 Emissionen, Biodiversitätsverlust,...) beim Preis ausweisen, dies könnte auch als option zum Bezahlen ausgewiesen werden (also nicht ein muss sonder als Option), oder eine imaginäre Fleischsteuer auf dem Menü deklarieren

Focal Factor Targeted by Intervention: External Factors

Specific Target Factor: Food Environment

Intervention Strategy: Default

Examples: rearrange the menu so that the vegetarian menu / dish is positioned more prominently, make the daily menu vegetarian, the daily or weekly special is vegetarian.

Translation: Das vegetarische Menü / Gericht anders auf der Karte positionieren, das Tagesmenü ist Vegetarisch, das Tages oder Wochen Spezial ist vegetarisch

Focal Factor Targeted by Intervention: External Factors

Specific Target Factor: Food Environment

Intervention Strategy: Visibility

Examples: this could be that "the kitchen suggests or the chef suggests" a vegetarian dish, the description of the vegetarian dishes could be amended, the vegetarian daily dish could made more visibility through an extra flyer or a sign, alternatively could the staff suggest the vegetarian option

Translation: beispielsweise "die Küche empfiehlt oder der Chef empfiehlt" ein vegetarisches Gericht, die Beschreibung des vegetarischen Gerichts anpassen, durch eine Tafel oder extra Flyer ein vegetarischen Tagesgericht hervorheben, durch das Personal die vegetarische Option anpreisen/empfehlen

Focal Factor Targeted by Intervention: External Factors

Specific Target Factor: Food Environment

Intervention Strategy: Portion size

Examples: amend the meat portion (weight) of a meat dish and increase the vegetable and starch proportions. Hence instead of a 180 gram steak, the steak would weigh 100 grams and the difference would be compensated with more vegetables or other sides.

Translation: die Fleischmenge (Gewicht) einer Portion vom Fleischgericht verkleinern und den Gemüseanteil oder Stärkeanteil erhöhen. Also beispielsweise anstatt eines 180 Gr Steak gibt es 100 Gr und dafür mehr Gemüse & Beilagen.

Focal Factor Targeted by Intervention: External Factors

Specific Target Factor: Food Environment

Intervention Strategy: Choice restriction

Examples: solely vegetarian menus and dishes are on the menu and guests would have to ask for meat, primarily vegetarian dishes and solely one or two meat dishes are on offer

Translation: Nur vegetarische Menüs oder Gerichte auf dem Menü und für Fleisch müsste nachgefragt werden, hauptsächlich vegetarische Gerichte und nur 1 oder 2 Fleischgerichte auf der Karte

Appendix C – Standard Menu

TAGESMENÜ

inkl. Selleriesuppe mit Meerrettichschaum oder Salat

Montag, 27. Februar 2023

FLEISCH

Kalbsgeschnetzeltes 23
getrocknete Tomaten, Oliven
Pasta

WOCHENHIT 1

Bratwurstschnecke BIO 28
Rösti, Zwiebelsauce

VEGI

Gefüllte Peperoni 24
Gerste, Frischkäse, Zucchettisauce

WOCHENHIT 2

Linsenhacktätschli 24
Salat, Guacamole

WOCHENDESSERT

Tobleronemousse 12

Restaurant Libelle | Maihofstrasse 61 | 6006 Luzern | Tel. 041 420 61 61

= vegetarisch
= vegan

DEKLARATION

Unser Fleisch und Fisch stammen ausschliesslich aus der Schweiz und werden über regionale Lieferanten bezogen.

Beim Kauf von Gemüse, Obst, Käse, Eier und Brot achten wir auf saisonale, regionale und teilweise biologische Produkte.

Appendix D – Amended Menu

TAGESMENÜ

inkl. Selleriesuppe mit Meerrettichschaum oder Salat

Montag, 27. Februar 2023

Mehr als 70% der Luzerner Bevölkerung hat eine Reduzierung des Fleischkonsums in Erwägung gezogen und bereits in Angriff genommen. Wähle ein fleischloses Gericht und leiste einen Beitrag fürs Klima.

FLEISCH

Kalbsgeschnetzeltes 23
getrocknete Tomaten, Oliven
Pasta

VEGI

Gefüllte Peperoni 24
Gerste, Frischkäse, Zucchettisauce

WOCHENHIT 1

Bratwurstschnecke BIO 28
Rösti, Zwiebelsauce

WOCHENHIT 2

Linsenhacktätschli 24
Salat, Guacamole

WOCHENDESSERT

Tobleronemousse 12

Restaurant Libelle | Maihofstrasse 61 | 6006 Luzern | Tel. 041 420 61 61

= vegetarisch
= vegan

DEKLARATION

Unser Fleisch und Fisch stammen ausschliesslich aus der Schweiz und werden über regionale Lieferanten bezogen.

Beim Kauf von Gemüse, Obst, Käse, Eier und Brot achten wir auf saisonale, regionale und teilweise biologische Produkte.

Appendix E – Introduction to Survey

UMFRAGE ZUM KONSUMVERHALTEN

Lund Universität

Montag, 27. Februar 2023 bis Freitag, 10. März 2023

Wir wünschen einen guten Appetit und hoffen, dass du den Nachmittag gestärkt in Angriff nehmen kannst. Um das Konsumverhalten in der Luzerner Gastronomie besser zu verstehen, sind wir dir sehr dankbar, wenn du die **Onlineumfrage** (ca. 5min) via obenstehendem QR-Code ausfüllen könntest. Unter allen Teilnehmenden verlosen wir einen **Gutschein über CHF 30.- und einen Kaffee** für deinen nächsten Gaumenschmaus in der Libelle.

Die Umfrage wurde als Teil einer Masterarbeit an der Lund Universität erstellt und wird in Zusammenarbeit mit der Libelle durchgeführt. Alle Daten werden streng vertraulich und anonym behandelt. Bei Fragen kannst du dich beim Personal oder bei der Kontaktperson der Universität Lund melden: an7384wi-s@student.lu.se

Vielen Dank für deine Unterstützung und viel Glück beim Gewinnspiel!

Restaurant Libelle | Maihofstrasse 61 | 6006 Luzern | Tel. 041 420 61 61

IIIEE Lund Universität | Tegnérsplatsen 4 | 221 00 Lund, Schweden

Appendix F – Online Survey

LUND UNIVERSITY

Umfrage zum Konsumverhalten in Luzern

Diese Umfrage ist Teil einer Masterarbeit an der Universität Lund in Schweden und wurde in Zusammenarbeit mit der Libelle erstellt. Alle Daten werden streng vertraulich und anonym behandelt und nach Beendigung der Studie gelöscht.

1. Mit welchem Geschlecht identifizierst du dich am ehesten? *

- ○ Weiblich
- ○ Männlich
- ○ Other...

2. Was ist dein Alter? *

- ○ 17 oder jünger
- ○ 18-25
- ○ 26-40
- ○ 41-55
- ○ 56-69
- ○ 70 oder älter

3. Welches ist die höchste Schulstufe, die du abgeschlossen hast, oder der höchste Abschluss, den du erworben hast? *

- Keinen Schulabschluss
- Abschluss auf Sekundarstufe
- Lehrabschluss (inkl Berufs und höhere Fachprüfungen)
- Diplomausbildung (Höhere Fachschule)
- Bachelor (Universität, ETH, FH)
- Master (Universität, ETH, FH)
- PHD/Doktorat

4. Generell achte ich darauf, dass ich mich im täglichen Leben umweltbewusst verhalte. *

Tägliches Verhalten kann beispielsweise Transport, Ernährung, Recycling oder andere Aktivitäten beinhalten.

- Stimme voll und ganz zu
- Stimme zu
- Neutral
- Stimme nicht zu
- Stimme überhaupt nicht zu
- Ich weiss es nicht

5. Ich bin mir über die Auswirkungen des Fleischkonsums auf die Umwelt bewusst. *

- Stimme voll und ganz zu
- Stimme zu
- Neutral
- Stimme nicht zu
- Stimme überhaupt nicht zu

6. Mein momentaner wöchentlicher Fleischkonsum. *

Wie oft isst du im Durchschnitt Fleisch? (pro Woche)

- ○ Ich esse nie Fleisch
- ○ Ich esse 1 mal oder weniger pro Woche Fleisch
- ○ Ich esse 2 - 3 mal pro Woche Fleisch
- ○ Ich Durchschnitt esse ich 4 - 5 mal pro Woche Fleisch
- ○ Ich esse täglich Fleisch

7. Mein Ernährungsverhalten. *

Beschreibe hier dein persönliches Verhalten

- ○ Ich habe mir noch nie überlegt, meinen Fleischkonsum zu reduzieren
- ○ Ich habe mir schon überlegt meinen Fleischkonsum zu reduzieren, habe diesen Plan aber nur teilweise u...
- ○ Meinen Fleischkonsum grenze ich bewusst ein
- ○ Ich ernähre mich vegetarisch oder vegan

8. Für welches Menü hast du dich heute entschieden? *

- ○ Vegi Tagesmenü
- ○ Fleisch Tagesmenü
- ○ Vegan Wochenhit
- ○ Fleisch Wochenhit

9. Wie viel Geld ist dir ein fleischloses Mittagsmenü im Restaurant maximal wert?

Betrag in CHF

Short answer text

10. Wie viel Geld ist dir ein Mittagsmenü mit Fleisch im Restaurant maximal wert?

Betrag in CHF

Short answer text

11. Email (Gewinnspiel)

Hinterlasse hier deine E-Mail Adresse falls du am Gewinnspiel teilnehmen möchtest.

Short answer text

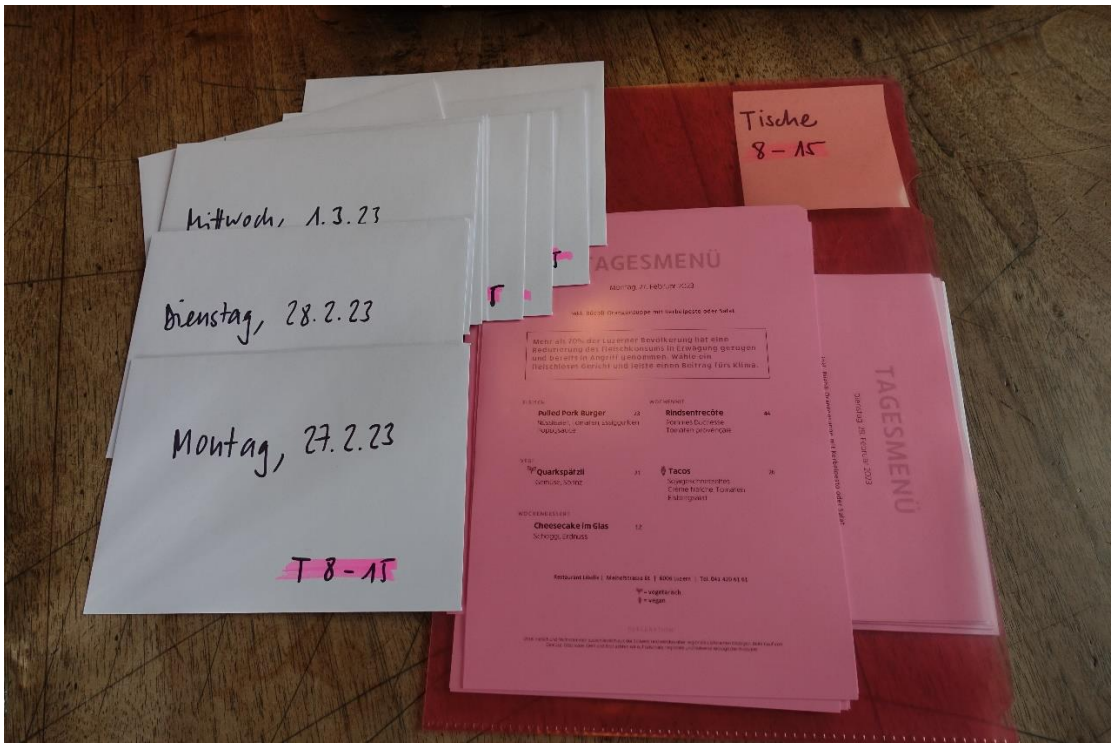
12. Fragen/Kommentare/Anregungen

Long answer text

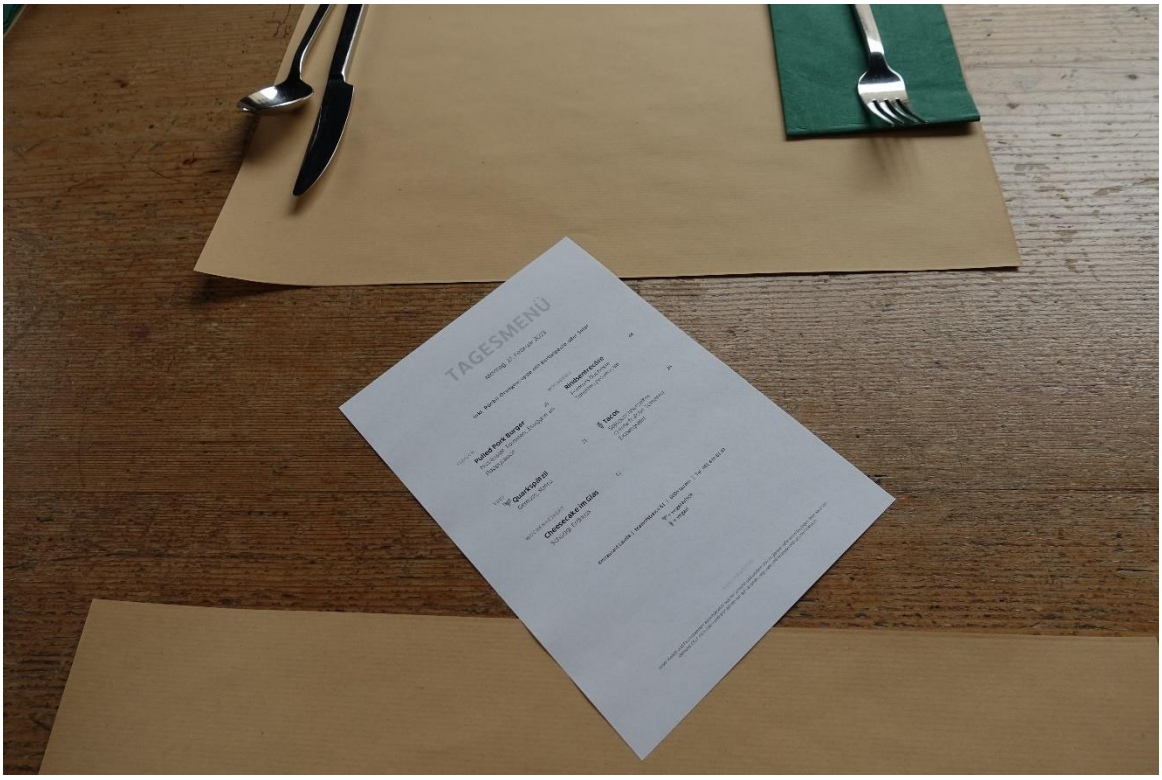
Mit freundlicher Unterstützung durch die Libelle

Appendix G – Restaurant Setup

All pictures were taken by the Author on the first day of the intervention experiment on February 27th 2023 at restaurant Libelle in Lucerne, Switzerland.




TAGESMENÜ
Pulled Pork Burger
Rindsentrecôte
Quarkspätzli
Tacos
Cheesecake im Glas


TAGESMENÜ
Pulled Pork Burger
Rindsentrecôte
Quarkspätzli
Tacos
Cheesecake im Glas


FAUSTBROT 9/10
WAHLWEISE MIT:
Salami Bio / Bauernschinken / Brie / Bergkäse


TAGESMENU

Appendix H – Process at the Restaurant

The service team was initially briefed on Monday, 27 February 2023 at 11 am prior to the first lunch service of the intervention the author was present in person for the first briefing together with the managing director. The purpose of the study and why it is of value to conduct such an experiment at the restaurant Libelle was explained. Questions from the staff were answered and the process steps were explained in detail so that all staff members had the same information and no open questions remained.

The staff was interested in the experiment and was curious to better understand why the order mattered and what the author tried to do accomplish through the experiment. One of the staff mentioned a recent further educational program he attended where he learned about the water consumption of 1 KG of beef and how he now considers what he eats much more consciously.

An important aspect which may impact the response to the questionnaire and the menu choice is when the questionnaire was provided to the guests. The agreement was to distribute the questionnaire to the tables after the food order was placed. Thus, the guests would have time to complete the questionnaire whilst waiting for the food. However, the process may not have always been followed by the staff due to high workload, stress or other distracting factors during a lunch service at a restaurant.

The menus were prepared for a week and kept in dedicated colour coded envelopes (Appendix G – Restaurant Setup). Tables 1 to 7 plus the gallery (tables 16 -21) received the standard menu and tables 8 to 15 received the menu including the social normative statement. The reason for this division of tables was to ensure a similar distribution of menus. The gallery is primarily booked to accommodate peak demand on specific days.

The orders were collected in envelops per day, which were colour coded per tables, see Appendix G. Upon completion of the lunch service the bons collected in the enveloped dedicated for a particular day, as shown in Appendix G. These were then counted and entered in an online form. The online form was populated by the head chef.

Appendix I – Data Baseline and Intervention

The Baseline orders for the Weekly hit 1 and Weekly hit 2 could not be differentiated between lunch and dinner orders. Over the week it is around 50/50 between lunch and dinner. There is a tendency is that earlier in the week there are more Weekly hit orders for lunch whereas towards the end of the week there tend to be more orders towards the evening. Thus, Monday to Wednesday the orders were divided by two and rounded up to the next full number in case of partial number. The Thursday and Friday orders of the Weekly hits during the baseline were divided by 2 and then rounded down to the next full number.

Menu	Week Day	Date	Daily Meat	Weekly Meat	Daily Vegetarian	Weekly Vegan	Daily Total
Baseline	Monday	30 Jan 2023	17	3	17	9	46
Baseline	Tuesday	31 Jan 2023	29	4	4	3	40
Baseline	Wednesday	1 Feb 2023	25	2	7	4	38
Baseline	Thursday	2 Feb 2023	25	4	10	6	45
Baseline	Friday	3 Feb 2023	18	2	7	8	35
Baseline	Monday	6 Feb 2023	30	2	7	4	43
Baseline	Tuesday	7 Feb 2023	22	2	21	0	45
Baseline	Wednesday	8 Feb 2023	11	1	7	1	20
Baseline	Thursday	9 Feb 2023	11	1	23	5	40
Baseline	Friday	10 Feb 2023	21	1	11	3	36
Baseline	Monday	13 Feb 2023	12	1	12	1	26
Baseline	Tuesday	14 Feb 2023	17	1	21	2	41
Baseline	Wednesday	15 Feb 2023	17	0	13	6	36
Baseline	Thursday	16 Feb 2023	32	0	10	2	44
Baseline	Friday	17 Feb 2023	12	0	12	0	24
Baseline	Monday	20 Feb 2023	17	4	15	2	38
Baseline	Tuesday	21 Feb 2023	10	0	11	2	23
Baseline	Wednesday	22 Feb 2023	29	2	9	2	42
Baseline	Thursday	23 Feb 2023	12	1	2	3	18
Baseline	Friday	24 Feb 2023	30	2	11	3	46
Standard	Monday	27 Feb 2023	12	4	16	9	41
Standard	Tuesday	28 Feb 2023	17	1	9	3	30
Standard	Wednesday	1 Mar 2023	18	0	4	3	25
Standard	Thursday	2 Mar 2023	8	1	15	3	27
Standard	Friday	3 Mar 2023	14	1	12	0	27
Standard	Monday	6 Mar 2023	4	0	8	4	16
Standard	Tuesday	7 Mar 2023	8	0	6	4	18
Standard	Wednesday	8 Mar 2023	25	1	7	4	37
Standard	Thursday	9 Mar 2023	12	0	3	2	17
Standard	Friday	10 Mar 2023	8	0	10	1	19
Intervention	Monday	27 Feb 2023	15	0	6	2	23
Intervention	Tuesday	28 Feb 2023	10	1	5	1	17
Intervention	Wednesday	1 Mar 2023	10	0	9	2	21
Intervention	Thursday	2 Mar 2023	8	5	4	3	20
Intervention	Friday	3 Mar 2023	11	1	7	2	21
Intervention	Monday	6 Mar 2023	6	2	4	2	14

Intervention	Tuesday	7 Mar 2023	10	0	7	3	20
Intervention	Wednesday	8 Mar 2023	16	0	5	2	23
Intervention	Thursday	9 Mar 2023	6	1	7	5	19
Intervention	Friday	10 Mar 2023	8	0	4	3	15

Appendix J – Baseline and Intervention Results

Baseline (the timeframe prior to the intervention: Jan 30th to February 24th 2023)

Overall number of orders: 726

Number of Vegetarian and Vegan orders: 296, which accounts for 41% of all orders.

Number of Meat orders: 430, which accounts for 59% of all orders.

Standard (standard menu during the intervention period: February 27th to March 10th 2023)

Overall number of orders: 257

Percentage of Vegetarian and vegan orders: 123, which accounts for 48% of all orders during the intervention period.

Percentage of Meat orders: 134, which accounts for 52% of all orders during the intervention period.

Intervention (menu containing social norm statement during intervention period: February 27th to March 10th 2023)

Overall number of orders: 193

Percentage of Vegetarian and vegan orders: 83, which accounts for 43% of the orders during the intervention period.

Percentage of Meat orders: 110, which accounts for 57% of all orders during the intervention period.

Grand Total (Jan 30th to March 10th)

Overall number of orders: 1176

Number of Vegetarian and Vegan orders: 502, which accounts for 43% of all orders.

Number of Meat orders: 674, which account for 57% of all orders

Appendix K – Online Survey Participants Overview

Date	With which gender do you identify most?	What is your age?	What is the highest school level you have completed or the highest degree you have earned?	How much money are you willing to pay for a vegetarian lunch menu at a restaurant?	Generally, I am mindful to behave in an environmentally conscious manner in my daily life.	I am aware of the consequences of meat consumption on the environment.	My food intake behaviour	Which menu did you choose today?	How much money are you willing to spend for a meat lunch menu at a restaurant?	My current weekly meat intake
27-Feb-23	Male	41-55	Master's degree	30	Agree	Agree	I have considered reducing my meat consumption, however I have only partially put this place into action	Meat Daily Menu	60	I eat 2-3 times meat per week
27-Feb-23	Female	41-55	Diploma, College of higher Education	25	Fully Agree	Fully Agree	I consciously limit my meat intake	Vegetarian Daily Menu	25	I eat once per week or less meat
27-Feb-23	Male	41-55	Apprenticeship and Professional Degree	10	Don't Agree	Agree	I have considered reducing my meat consumption, however I have only partially put this place into action	Meat Daily Menu	30	I eat meat on a daily basis
27-Feb-23	Male	26-40	Apprenticeship and Professional Degree	N/A	Agree	Agree	I have considered reducing my meat consumption, however I have only partially put this place into action	Meat Daily Menu	N/A	I eat 2-3 times meat per week
27-Feb-23	Male	56-69	Diploma, College of higher Education	17	Neutral	Agree	I have considered reducing my meat consumption, however I have only partially put this place into action	Meat Daily Menu	21	I eat 4-5 times per week meat
27-Feb-23	Male	56-69	Master's degree	30	Fully Agree	Fully Agree	I have considered reducing my meat consumption, however I have only partially put this place into action	Meat Daily Menu	30	I eat 4-5 times per week meat
27-Feb-23	Male	26-40	Apprenticeship and Professional Degree	N/A	Agree	Agree	I have considered reducing my meat consumption, however I have only partially put this place into action	Meat Daily Menu	N/A	I eat 2-3 times meat per week
27-Feb-23	Male	26-40	Apprenticeship and Professional Degree	25	Agree	Fully Agree	I consciously limit my meat intake	Meat Daily Menu	25	I eat 2-3 times meat per week
27-Feb-23	Female	26-40	Apprenticeship and Professional Degree	25	Fully Agree	Fully Agree	I consciously limit my meat intake	Meat Daily Menu	45	I eat 2-3 times meat per week

27-Feb-23	Male	26-40	Diploma, College of higher Education	18	Neutral	Neutral	I have never considered reducing my meat consumption	Meat Daily Menu	22	I eat 4-5 times per week meat
27-Feb-23	Male	26-40	Bachelor's Degree	16	Fully Agree	Fully Agree	I consciously limit my meat intake	Meat Daily Menu	25	I eat once per week or less meat
27-Feb-23	Female	26-40	PHD	30	Agree	Fully Agree	I have considered reducing my meat consumption, however I have only partially put this place into action	Vegan Weekly hit	40	I eat 2-3 times meat per week
27-Feb-23	Male	26-40	PHD	25	Agree	Agree	I have considered reducing my meat consumption, however I have only partially put this place into action	Meat Daily Menu	45	I eat 2-3 times meat per week
28-Feb-23	Female	26-40	Master’s degree	20	Fully Agree	Fully Agree	I consciously limit my meat intake	Meat Daily Menu	30	I eat once per week or less meat
28-Feb-23	Male	26-40	Master’s degree	15	Agree	Fully Agree	I consciously limit my meat intake	Meat Daily Menu	20	I eat 4-5 times per week meat
28-Feb-23	Female	26-40	Diploma, College of higher Education	25	Agree	Fully Agree	I consciously limit my meat intake	Vegetarian Daily Menu	25	I eat 2-3 times meat per week
28-Feb-23	Male	41-55	Bachelor's Degree	30	Agree	Fully Agree	I have never considered reducing my meat consumption	Meat Daily Menu	30	I eat meat on a daily basis
28-Feb-23	Male	26-40	Apprenticeship and Professional Degree	N/A	Fully Agree	Fully Disagree	I have never considered reducing my meat consumption	Meat Daily Menu	N/A	I eat meat on a daily basis
28-Feb-23	Male	70 or older	Master’s degree	25	Agree	Agree	I have considered reducing my meat consumption, however I have only partially put this place into action	Vegetarian Daily Menu	25	I eat 2-3 times meat per week
01-Mar-23	Female	56-69	Apprenticeship and Professional Degree	25	Fully Agree	Neutral	I consciously limit my meat intake	Vegetarian Daily Menu	30	I eat once per week or less meat
01-Mar-23	Female	70 or older	Diploma, College of higher Education	20	Agree	Neutral	I have considered reducing my meat consumption, however I have only partially put this place into action	Meat Daily Menu	24	I eat meat on a daily basis

01-Mar-23	Female	26-40	Bachelor's Degree	26	Agree	Fully Agree	I am vegetarian or vegan	Vegan Weekly hit	30	I never eat meat
02-Mar-23	Female	56-69	Diploma, College of higher Education	20	Neutral	Agree	I have never considered reducing my meat consumption	Vegetarian Daily Menu	25	I eat once per week or less meat
02-Mar-23	Female	56-69	Diploma, College of higher Education	N/A	Fully Agree	Fully Agree	I consciously limit my meat intake	Vegetarian Daily Menu	N/A	I eat 2-3 times meat per week
02-Mar-23	Female	41-55	Master's degree	30	Neutral	Agree	I have considered reducing my meat consumption, however I have only partially put this place into action	Meat Daily Menu	30	I eat 4-5 times per week meat
02-Mar-23	Male	56-69	PHD	30	Agree	Agree	I have considered reducing my meat consumption, however I have only partially put this place into action	Meat Daily Menu	30	I eat 2-3 times meat per week
02-Mar-23	Female	26-40	Bachelor's Degree	25	Agree	Fully Agree	I consciously limit my meat intake	Vegetarian Daily Menu	30	I eat once per week or less meat
02-Mar-23	Male	56-69	Apprenticeship and Professional Degree	25	Agree	Agree	I have considered reducing my meat consumption, however I have only partially put this place into action	Meat Daily Menu	25	I eat 2-3 times meat per week
03-Mar-23	Female	26-40	Bachelor's Degree	25	Agree	Fully Agree	I am vegetarian or vegan	Vegetarian Daily Menu	28	I never eat meat
03-Mar-23	Female	26-40	Master's degree	25	Agree	Agree	I consciously limit my meat intake	Meat Daily Menu	30	I eat once per week or less meat
03-Mar-23	Male	26-40	Bachelor's Degree	23	Agree	Fully Agree	I consciously limit my meat intake	Meat Daily Menu	32	I eat 2-3 times meat per week
03-Mar-23	Male	56-69	Master's degree	20	Fully Agree	Fully Agree	I consciously limit my meat intake	Vegetarian Daily Menu	24	I eat 2-3 times meat per week
06-Mar-23	Male	56-69	Bachelor's Degree	18	Agree	Agree	I consciously limit my meat intake	Meat Daily Menu	25	I eat once per week or less meat

07-Mar-23	Female	26-40	Diploma, College of higher Education	24	Fully Agree	Fully Agree	I am vegetarian or vegan	Vegan Weekly hit	28	I never eat meat
07-Mar-23	Male	41-55	Diploma, College of higher Education	25	Agree	Fully Agree	I have never considered reducing my meat consumption	Vegetarian Daily Menu	25	I eat meat on a daily basis
07-Mar-23	Male	56-69	Bachelor's Degree	30	Agree	Agree	I consciously limit my meat intake	Meat Daily Menu	30	I eat 2-3 times meat per week
07-Mar-23	Male	56-69	Diploma, College of higher Education	N/A	Agree	Agree	I have never considered reducing my meat consumption	Vegetarian Daily Menu	N/A	I eat 2-3 times meat per week
07-Mar-23	Female	41-55	PHD	20	Agree	Agree	I have considered reducing my meat consumption, however I have only partially put this place into action	Meat Daily Menu	35	I eat 4-5 times per week meat
07-Mar-23	Female	41-55	Master's degree	18	Agree	Agree	I have considered reducing my meat consumption, however I have only partially put this place into action	Meat Daily Menu	24	I eat 2-3 times meat per week
08-Mar-23	Female	26-40	Master's degree	25	Agree	Agree	I have considered reducing my meat consumption, however I have only partially put this place into action	Vegetarian Daily Menu	28	I eat once per week or less meat
08-Mar-23	Male	26-40	Apprenticeship and Professional Degree	20	Agree	Agree	I consciously limit my meat intake	Meat Daily Menu	25	I eat once per week or less meat
09-Mar-23	Male	41-55	Bachelor's Degree	20	Agree	Agree	I consciously limit my meat intake	Meat Daily Menu	25	I eat 2-3 times meat per week
10-Mar-23	Female	41-55	Apprenticeship and Professional Degree	21	Agree	Agree	I consciously limit my meat intake	Vegetarian Daily Menu	30	I eat once per week or less meat
10-Mar-23	Female	26-40	Master's degree	25	Fully Agree	Fully Agree	I have considered reducing my meat consumption, however I have only partially put this place into action	Meat Daily Menu	25	I eat 2-3 times meat per week
10-Mar-23	Female	56-69	Diploma, College of higher Education	30	Fully Agree	Agree	I consciously limit my meat intake	Meat Daily Menu	40	I eat once per week or less meat

Appendix L – Online Survey Answers

1. Overall Number of participants: 45
   - Female Participants: 21
   - Male Participants: 24

2. Age range of participants: no participants younger than 25
   - 17 or younger: 0
   - 18-25: 0
   - 26-40: 21
   - 41-55: 10
   - 56-69: 12
   - 70 or older: 2

3. Highest school level completed or highest degree earned: all participants with at least an apprenticeship.
   - No school degree: 0
   - Secondary School Degree: 0
   - Apprenticeship and Professional Degree: 10
   - Diploma, College of higher Education: 11
   - Bachelor's Degree: 9
   - Master's Degree: 11
   - PHD: 4

4. General mindfulness to behave in an environmentally conscious manner in daily life.
   - Do not know: 0
   - Fully disagree: 0
   - Disagree: 1
   - Neutral: 4
   - Agree: 28
   - Fully agree: 12

5. Awareness of consequences of meat consumption on the environment.
   - Fully disagree: 1
   - Disagree: 0
   - Neutral: 3
   - Agree: 22
   - Fully agree: 19

6. Current weekly meat consumption.
   - I never eat meat: 3
   - I eat once per week or less meat: 12
   - I eat 2-3 times meat per week: 19
   - I eat 4-5 times per week meat: 6
   - I eat meat on a daily basis: 5

7. My meat intake behaviour.
    - I have never considered reducing my meat consumption: 6
    - I have considered reducing my meat consumption, however I have only partially put this place into action: 17
    - I consciously limit my meat intake: 19
    - I am vegetarian or vegan: 3

8. Chosen menu on the day the survey was taken.
    - Vegetarian daily menu: 13
    - Vegan weekly hit: 3
    - Meat daily menu: 29
    - Meat weekly hit: 0

Questions 8. to 10. were mandatory questions to complete the survey. The restaurant was given permission to ask two questions for their benefit, which were not mandatory, questions 9. and 10. Which results are shown next.

9. Willingness to spend for a vegetarian lunch menu at a restaurant.
    - Responses: 40
    - In case a range was given the highest amount was chosen. A value of CHF 1.- was omitted form the results as an unreasonable answer.
    - Min: 10
    - Max: 30
    - Average: 23.4

10. Willingness to spend for a meat lunch menu at a restaurant.
    - Responses: 40
    - In case a range was given the highest amount was chosen. A value of CHF 100.- was omitted form the results as an unreasonable answer.
    - Min: 20
    - Max: 60
    - Average: 29.4

Appendix M – List of consulted experts

Reference used in text	Organization	Date	Interaction
E1	University researcher in Zurich	December 2022 to April 2023	Online meetings
E2	Environmental Department canton of Lucerne	December 2022 to January 2023	E-mail exchange and online interview
E3	Environmental Department canton of Lucerne	January 2023	E-mail exchange
E4	Environmental consulting of the city of Lucerne	December 2022	E-mail exchange
E5	Clinical surgeon and advocate for planetary diet	January 2023	E-mail exchange
E6	Expert in health promotion and sustainable development in Berne and Zurich	January to March 2023	E-mail exchange
E7	Tourism bureau of Lucerne	January 2023	E-mail exchange
E8	Gastronomy association of Lucerne	January 2023	E-mail exchange
E9	Gastronomy practitioner in the city of Lucerne	December 2022 to March 2023	Online meetings and interview