Policy Options for Sustainable Food Consumption – Review and Recommendations for Sweden

Mistra Sustainable Consumption report 1:10

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The report is from a collaborative project involving Mistra Sustainable Consumption, SLU Future Food, the Beijer Institute of Ecological Economics, the Centre for Collective Action Research (CeCAR) at the University of Gothenburg and Chalmers University of Technology.

Mistra Sustainable Consumption

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Foreword

This report is the result of a collaborative project involving Mistra Sustainable Consumption, SLU Future Food, the Beijer Institute of Ecological Economics, the Centre for Collective Action Research (CeCAR) at the University of Gothenburg and Chalmers University of Technology. The aim of the project was to map the current state of knowledge about policy instruments for environmentally sustainable food consumption and to identify what public actors already now could do to promote a positive development in this area. The report targets officials and decision-makers in the area of food and the environment, as well as researchers and research funders.

We would like to point out that this project began before the global COVID-19 pandemic broke out. Currently while writing this report, the sustainability of food systems in Sweden and globally has been brought into focus from several new angles. In particular in terms of its resilience to various external shocks, animal husbandry in a world where natural ecosystems are diminishing and where humans and animals are getting closer and closer to each other, weakened international political cooperation, an upswing in local trade platforms for food and a rapidly changing and unpredictable political landscape. We can conclude that sustainable food consumption is more in the limelight than ever before.

The policy instruments surveyed in this report concern how sustainable food consumption can be promoted given how today's food systems function; in other words, that food is produced and consumed mainly as a good traded nationally and internationally, where the free choice of the consumer is central, and where the production of food is largely controlled by market forces. Given the enormous environmental and health challenges the global food system is facing, and given the enormous shock the world is experiencing with the COVID-19 pandemic, great uncertainty surrounds future food systems. There are ongoing discussions about new ways of organising and managing the food system, but these are not elaborated on in this report.

The authors of this report are Elin Röös, Sarah Säll and Kajsa Resare Sahlin (Swedish University of Agricultural Sciences), Jörgen Larsson and Erik André (Mistra Sustainable Consumption, Chalmers University of Technology), Therese Lindahl and Malin Jonell (the Beijer Institute of Ecological Economics), Martin Persson (Chalmers University of Technology) and Niklas Harring (University of Gothenburg, CeCAR).[1] In addition, Emma Moberg (Swedish University of Agricultural Sciences) contributed to the content of the report through her extensive comments, Filip Danielsson (MSc student, Chalmers University of Technology) contributed to the sections on sustainability requirements for food sales, and the following people recommended literature and/or gave feedback on the material: Anna-Karin Quetel (Swedish Food Agency), Pia Lindeskog (Public Health Agency of Sweden), Liselotte Schäfer Elinder (Karolinska Institutet) and Liv Fjellander (Swedish Environmental Research Institute). We thank all for these contributions, but wish to make it clear that the authors alone are responsible for the content of this report.

[1] The project was initiated by Jörgen Larsson and Elin Röös. Kajsa Resare Sahlin was the coordinator for the project.

Summary

The environmental impact of the average Swede's diet exceeds the planetary limits for the food system in most areas. Over 15% of consumption-based greenhouse gas emissions come from food in Sweden. Sweden's agricultural landscape has the largest proportion of European Red List species of all landscape types in Sweden and food imports are associated with high rates of land use, pesticides and veterinary antibiotics in other countries. Our diet is also not sustainable in terms of health – for example, 51% of Swedes are overweight and many of the most common diseases and causes of death are linked to diet.

This report identifies and discusses policy instruments that the state and other public actors could introduce to steer food consumption in Sweden towards a more environmentally sustainable diet. Seventeen policy instruments operating either through knowledge and support, changes in relative prices, or regulation and requirements have been identified and previous research on policy effectiveness, costs and acceptance has been mapped out in a way that we hope is clear and easy to understand. Based on the current state of knowledge, we have formulated three recommendations on what public actors could do to accelerate the transition to a more sustainable food system.

1. **Intensify work in the public sector**
2. **Develop national targets for sustainable food consumption**
3. **Develop and implement effective and attractive policy instrument packages**

The mapping and analysis show that there is a need for research on policy instruments for environmentally sustainable food consumption, particularly when it comes to combinations of instruments. However, there is a sufficient evidence base for the immediate development and implementation of policy instruments to deal with the climate, environmental and health impacts of food. A focus on targets and policy instruments in the food area, as outlined above, is also fully in line with the EU's new Farm-to-Fork strategy. The policy instruments discussed in the report can probably achieve only part of the huge, transformative changes required to limit the production and consumption of food to planetary limits, but a central issue is how to do this. Part of the answer lies in a change in food consumption and here we believe that we know where the answer lies: public actors ought to develop and implement a variety of policy instruments and systematically evaluate them – it is in this more large-scale implementation that the real need for research lies. The challenge of reducing the environmental impact of food consumption in Sweden is considerable, but there are good opportunities for nudging the trend towards more environment-friendly and health-friendly sustainable food consumption through the deployment of new policy instruments.

1. Intensify work in the public sector

Eating habits established at a young age can play a major role in the rest of one's life. Through meals in schools and other public sector activities, knowledge and awareness of sustainable and healthy food can be spread, which can help to bring about a change of diet. The initiatives already being used in the public sector seem to work well, are (often) not expensive, and are generally very well accepted. However, efforts can be stepped up, for example by means of a national education initiative on food and sustainability for the country's preschool and school chefs, and clearer controls on what food is served to minimise its environmental impact; a greater connection between the school mealtime and teaching and learning activities and choice editing in all tax-funded activities such as indoor swimming pools and hospital cafés. However, the public sector accounts for only 4% of total food consumption in Sweden, which means that private food consumption also needs to change in order to achieve large-scale change. Although food in the public sector has a certain direct impact on the environment and health, it is probably its indirect value in terms of the signal it sends that matters the most: showing the way and providing inspiration for a sustainable lifestyle.

2. Develop national targets for sustainable food consumption

The use of policy instruments that seek to control people's behaviour through *knowledge and support* alone is not likely to change people's diets sufficiently to achieve Sweden's environmental objectives and improve public health. Our assessment is that stronger policy instruments are needed, i.e., *changes in relative prices* and *changes in regulations and requirements.* In order to pave the way for the implementation of these kinds of instruments, national targets for sustainable food consumption can be important.

Today, retail trade and the food industry already have a big impact on our food choices through pricing, marketing and choice. Nevertheless, gaining public acceptance of the state influencing our food choices through targets and policy instruments can be politically sensitive and fraught. Perhaps a clearer link between the environment and public health could remedy this; often, improved health and reduced environmental impact from food go hand in hand. The overconsumption of food is one obvious example, reduced consumption of red meat is another.

Environmentally sustainable food *consumption* is dependent on sustainable *production* of food – both in Sweden and in other countries. The development of national targets for food consumption must therefore take into account the consequences in a number of areas of sustainability – environmental and public health of course, but also degree of food self-sufficiency, employment, equality, health care costs, the profitability of Sweden's agriculture and food industry and other effects on the landscape and rural areas.

3. Develop and implement effective and attractive policy instrument packages

Policy instruments by themselves often have a relatively weak effect. Instead, combinations or packages of instruments are needed that can balance goal conflicts and lessen the conflict between effectiveness and acceptance. It is also important to target instruments to those actors who have the greatest opportunity to influence what we eat, which means shifting the focus from end-consumers to also include retail trade and the food industry as well.

A package of policy instruments for sustainable food consumption could usefully contain several different types of economic, informational and regulatory instruments. The system in which policy instruments are introduced, how they are justified, and how tax revenues can influence their acceptance among the population. For example, differentiating VAT on food based on the food's environmental impact and health impacts – which would increase the price of red meat but lower the price of fruit and vegetables – would probably enjoy greater support from the public, especially if it were preceded by a comprehensive information campaign, compared with simply introducing a tax on red meat alone. If the revenues from economic instruments are also earmarked for investments in more sustainable production systems or for initiatives for people on low incomes, the research shows that acceptance can be further enhanced. On the production side, this can be done, for example, by increasing aid to grazing lands that are important for biodiversity; by investing in producing more fruit, vegetables and legumes in Sweden; and by investing in value added production in the animal products sector in order to reduce the number of animals while maintaining turnover and employment.


BROOKLYN

Background

Food production accounts for 20–35% of global greenhouse gas emissions (IPCC, 2019) and food production (agriculture, fisheries and aquaculture) is a major driver of biodiversity loss globally (IPBES, 2019). Most of the greenhouse gas emissions from food production occur in agriculture and consist of ruminant methane, nitrous oxide from fertilization, and carbon dioxide from land use change (e.g., deforestation). Emissions also arise from the use of fossil energy in agriculture and fisheries and in subsequent stages such as processing, transport and storage. Furthermore, food production accounts for about 70% of global freshwater use (Willet, et al., 2019) and agriculture uses about 40% of the ice-free land area of the planet (FAOSTAT, 2020), which displaces natural ecosystems and threatens many plant and animal species. Only 13 crops, including palm oil and soya beans, cause 70% of biodiversity loss due to agricultural land use (Chaudhary & Kastner, 2016). At the global level, roughly the same quantity of antimicrobials are used for food-producing animals as for humans, but the use of veterinary antibiotics is a more prominent source of antibiotic resistance (van Boeckel et al., 2017). The Swedish diet moreover has a great impact on the environment: for the climate, biodiversity, land use and the application of nitrogen and phosphorus, the impact is many times greater than can be considered sustainable (Figure 1).

At the same time, today's global agriculture, aquaculture and fisheries produce large quantities of food that give many people access to a varied diet throughout the year. Globally, enough food is produced to feed all inhabitants of the world, but the food is unevenly distributed: two billion people are overweight while 820 million people have too little to eat (FAO, 2019). A significant proportion of the food produced is never consumed – losses occur at all stages in the agri-food chain, but in rich countries such as Sweden, mainly at household level. There is a lack of good data on the magnitude of this waste, but estimates show that as much as one third of the food produced is discarded or not consumed (FAO, 2011).[2]

In recent years, a growing number of research reports have shown that achieving a more environmentally sustainable food system requires improvements in production as well as reduced food waste and changes in dietary habits (Willett, et al., 2019). When it comes to dietary changes, it is primarily a reduction in the consumption of animal products that has great potential to reduce the environmental impact associated with food, particularly in terms of climate impact (Röös et al., 2017). As for protecting biodiversity, it is important to avoid further expansions of agricultural land, especially in tropical regions (Moberg et al., 2020) and to promote diversity in the agricultural landscape through, for example, more varied cropping systems, maintenance of biodiversity corridors, and the conservation of traditional agricultural land use methods, such as grazing and mowing (Gustavsson et al., 2007; Lindborg et al., 2008). In addition, a more efficient use of resources (particularly when it comes to nitrogen but also other nutrients, water, soil and energy), reduced use of chemical pesticides and measures to conserve and improve soil fertility are necessary improvements in production in order to reduce the environmental impact of agriculture and to maintain future production capacity. In the case of wild fisheries, it is essential to ensure that they are limited to sustainable fish stocks and that any negative impacts on aquatic environments and greenhouse gas emissions are minimised.

[2] As a result of increased attention on the issue, the FAO is developing two new indices: one for measuring losses arising up to the point of sale (Food Loss Index – FLI) and one for measuring waste in households (Food Waste Index – FWI). According to the FLI, about 14% of all food produced is lost before it reaches trade. Work on the FWI is in progress. Read more at: www.fao.org/food-loss-and-food-waste/en

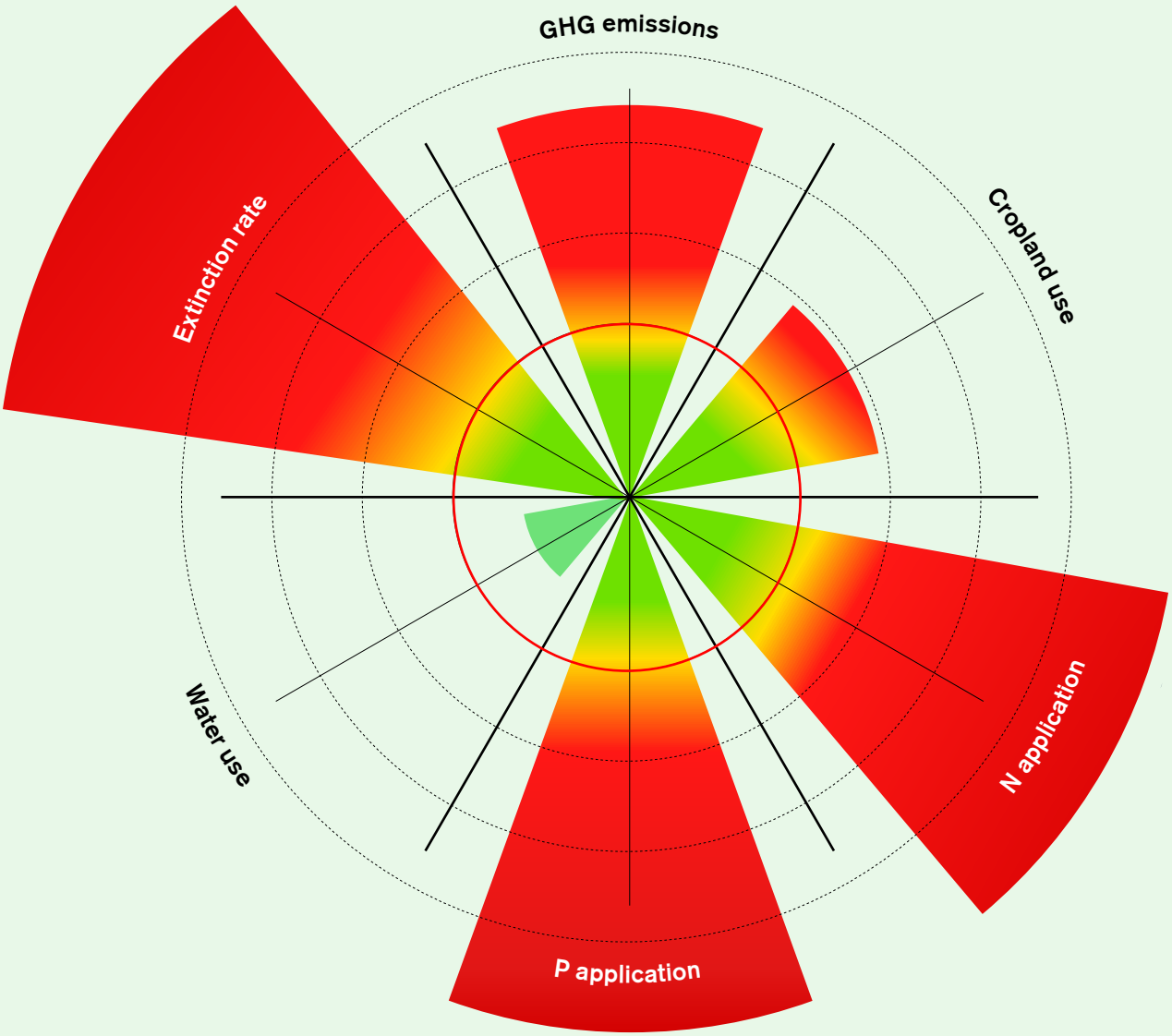

Figure 1: Graph from Moberg et al. 2020 which shows the average diet in Sweden in relation to the planetary boundaries according to the EAT-Lancet report (Willet et al., 2019). The inner red circle shows the sustainable level of environmental impact of the per capita diet in terms of climate impact, land use, species extinction, water use, and nitrogen and phosphorus use. Each dashed circle indicates that this limit has been exceeded by 100%.

More than half of all fish and shellfish consumed globally today are farmed (FAO, 2018) and thus indirectly dependent on wild fisheries and land-based agricultural production. In order to achieve sustainability, it is therefore of the utmost importance that fish feed is produced sustainably and that the anticipated expansion of aquaculture is made more sustainable, for example, by the use of recirculating systems or fish and shellfish species that are less dependent on feed.

There is no clear definition of the term 'environmentally sustainable food consumption' because it depends on what is included in the term and in what context the term is used. In Sweden there are no targets for sustainable food consumption, but in a country like Sweden where the consumption of meat, seafood and dairy products is high from a global perspective, a reduction in the consumption of animal products has the greatest potential to reduce the climate impact from diets (Röös et al., 2017). An important measure for reducing the negative impact on biodiversity is to reduce the consumption of products from water scarce regions or which are at risk of contributing to deforestation or to a higher rate of land use in tropical regions (Moberg, et al., 2020). By choosing organic products, the use of pesticides is significantly reduced. Reducing waste and reducing overconsumption are other important measures for more efficient resource utilisation.

In addition to the environmental challenges, food consumption today poses major problems for public health. Today, 51% of people in Sweden are overweight and average weight increased by 5.6 kg between 1995 and 2017; a trend that is not sustainable in the long term (Hemmingsson, 2020; Public Health Agency of Sweden, 2020). A healthy diet often goes hand in hand with a more environmentally sustainable diet. The Swedish Food Agency recommends more vegetables, fruit and berries and less red meat in its combined dietary advice for health and environment (Figure 2).

More

- Vegetables
- Fruit and berries
- Fish and seafood
- Nuts and seeds
- Movement in everyday life

From To

- White flour → wholemeal
- Butter-based → plant-based cooking fats/oils
- High-fat → low-fat dairy products

Less

- Red meat and cured meat products
- Salt
- Sugar
- Alcohol

Figure 2: The recommendations of the Swedish Food Agency.

Structure of this report

The aim of this report is to map out and discuss policy instruments for more environmentally sustainable food consumption and to identify what public actors could already be doing to promote a positive trend. Seventeen different instruments are presented. They are categorised in Table 1 according to whether they can be considered to operate mainly through *knowledge and support, changes in relative prices,* or *regulations and requirements.* These are in line with classical ways of categorising the state's exercise of power on the basis of 'stick, carrot or sermon', that is, punishment, reward or persuasion (Vedung, 1998). The authors have conducted a survey of existing studies guided by the *systematic mapping* method (James et al., 2016). In March 2020, a workshop was held in which ten researchers and two government agency experts participated. At this workshop, the participants were asked to supplement the mapping, and to evaluate a number of policy instruments based on their effectiveness and feasibility, and to present suggestions for policy packages. The survey and the results from the workshop have provided the basis for the content of this report.

The focus of the report is on policy instruments that can be implemented by national, regional or local governments. In a recent report by the Swedish Consumer Agency (Lindahl & Jonell, 2020), state and public actors (together with the retail sector) were identified as particularly important for steering food consumption in a more environmentally sustainable direction. Thus, this report does not include measures implemented by private actors on a voluntary basis (for example, industry agreements, choice editing or nudging in shops), nor instruments for more sustainable food production (for example, aid and payments of compensation as part of agricultural policy). In the concluding discussion however, we discuss policy packages that could contain a broader spectrum of policy instruments to influence consumption.

The report deals with environmentally sustainable food consumption in a broad sense, that is, both climate and other environmental aspects, but it does not cover the extensive literature on public health strategies.[3] However, because there may be lessons to be learned from the health area that are also relevant for steering consumers towards environmental sustainability, and because there are often synergies between a healthy and environmentally sustainable diet, the report's conclusions have to some extent also been based on knowledge of policy instruments for improving public health.

The aim of this report is to discuss the policy effectiveness, costs and acceptance of policy instruments. However, the documented knowledge about these aspects of various instruments varies greatly in the literature. Most studies only cover policy effectiveness.

Policy effectiveness refers to how well an instrument fulfils the goal of steering food consumption in a more sustainable direction. It may be worth pointing out that policy effectiveness can be understood in different ways: on the one hand, how effective an instrument is in reducing the overall environmental impact of food consumption and, on the other, how effective it is for achieving a set target. An instrument such as sustainability requirements when purchasing produce for school meals, may have a low effectiveness in reducing the environmental impact of Sweden's food consumption in total, since school meals make up such a small a proportion of the total consumption of food; but it can be effective in achieving a set target that applies only to school meals.

[3] See, for example, Bergström et al., 2017. Insatser för att främja hälsosamma matvanor och fysisk aktivitet. En kartläggande litteraturöversikt. [Efforts to promote healthy eating habits and physical activity.A mapping literature review]. Karolinska Institutet.

Knowledge and support	Changed relative prices	Regulation and requirements
Positive labelling	Taxes: Consumer price increases	Regulation of choice
Negative labelling	Subsidies: Consumer price reductions	Consumption allowances for meat
Mandatory declaration of environmental footprints		Regulation of marketing
Information campaigns		Requirements for improved sustainability of food sold
Consumer guides and dietary advice		Guidelines and environmental criteria for public sector meal services
Training of school chefs and other key actors		
Educational tools		Menu restrictions
Nudging in public or private restaurants		
Nudging in shops		

Table 1: Categorisation of the 17 policy instruments discussed in this report based on three types of mechanisms that the state can use to steer society towards sustainable food consumption.

The possibility of implementing policy instruments is moreover affected by several other factors. One factor is the costs associated with a particular instrument. Some instruments and measures may entail significantly higher costs for reducing emissions by a certain amount compared with other alternatives. In order to minimise the overall costs, in theory, instruments ought to be introduced so that the marginal costs of emissions reductions are as low as possible, meaning that reducing one more tonnes of emissions ought to be done where it is cheapest. The costs to society and how these are distributed between various actors also affect feasibility, since instruments that entail high costs (especially for powerful actors) will encounter stronger resistance.

Acceptance is a crucial aspect of the introduction of policy instruments, partly because it is important in principle in a democratic society and partly because it is difficult to introduce instruments if public opinion is strongly against them. If strong opposition exists, politicians – whose political survival and scope for action are based on popular support – will be wary of introducing them (Burstein, 2003).

The legal aspects of the policy instruments, that is whether they are feasible under current Swedish and international legislation, are not explicitly covered in this report. However, we present some real-life examples of instruments which thus have been proven to be implementable.

Policy instruments in the Knowledge and Support category

Information and training tools can have an impact mainly by building knowledge, raising awareness and supporting consumers to change their habits in an otherwise unchanged food landscape. This is the main type of policy instrument used by the public sector in Sweden today, for example in the form of advice and guidelines from the Swedish Food Agency through dietary advice (which also encompasses environmental aspects) and the training of school chefs in different municipalities. Nudging is another supportive method where a certain behaviour can be promoted by changes in the choice architecture.

Increasing the individual's knowledge through providing information and thus contributing to a change in attitude is one of the oldest and most frequently used methods for trying to change people's behaviour (Kollmuss & Agyeman, 2002). This report differentiates between information provided directly to the consumer at the time of purchase (i.e. in a shop or restaurant, for example through on-package labelling) and information that the consumer receives outside the food environment (e.g. information campaigns). Front-of-package labelling can be either positive, negative, or demonstrate the environmental footprint of a product. Positive labelling generally signals that a particular product is better than others, that is, has a positive quality, while negative labelling signals that the product is worse than the average (Grankvist, 2002).

Positive labelling

Eco-labelling can reduce environmental impacts in two ways: by producers changing their production practices in order to get certified, and through changing consumers' choices. Examples of voluntary positive labelling in Sweden are the EU and the KRAV organic logos, Rainforest Alliance, Marine Stewardship Council (MSC) and Aquaculture Stewardship Council (ASC) (for fish and shellfish). At present, the Swedish state does not impose any requirements on eco-certification and labelling for food that would help consumers choose food that is better for the environment. The Swedish state is only (indirectly) involved in the EU organic logo, as it is an Eu-wide label (based on Regulation (EU) 2018/848). However, there are requirements for food to be labelled with, for example, a list of ingredients and nutritional value, and for some products (e.g. meat, seafood and fruit) the label must state the product's origin.[4]

The Swedish Keyhole symbol is an example of nutrition labelling where the state, via the Swedish Food Agency, administers the labelling. It was launched in 1989 and for many years now it also exists in Norway, Denmark and Iceland. The Keyhole currently functions as a voluntary undertaking for businesses operating in the agri-food chain and the label may be used on foods that meet certain criteria for their sugar, salt, and whole grain/fibre and fat content (LIVSFS 2015:1). The results show that the Keyhole label steers consumers towards healthier choices and stimulates product development (Amcoff, 2012; Hedengren & Wassenius, 2015). A meta-analysis from 2019, which compiled and synthesised the results of 60 previous studies from 11 countries, showed that health-related labels have some effect on consumer behaviour. Among other things, the study showed that energy intake decreased by 6.6% and vegetable intake increased by 13.5% after introducing the label (Shangguan, et al., 2019).

[4] https://www.livsmedelsverket.se/produktion-handel--kontroll/information-markning-och-pastaenden?AspxAutoDetectCookieSupport=1

Eco-labelling has been criticised for being comparatively ineffectual in helping the consumer make the best choices"

There is a relatively large amount of literature on who chooses eco-labelled products (for example, Thøgersen 2000; Aertsen et al., 2009), what consumers know about different labels, and how this affects their propensity to choose eco-labelled food (e.g. Grunert et al., 2014) and whether labelling influences consumers' choices (e.g. Taufique et al., 2016). One example of the latter is a randomised controlled study from Sweden, which examined the effect of a qualitative climate label on milk, i.e., a label signalling that the company in question is working to reduce its emissions. The results showed an increase in demand for the labelled option of 6–8% (Elofsson et al., 2016). There are also studies of how much more people are willing to pay for an eco-labelled product (Johnston & Roheim, 2006; Didier & Lucie, 2008) and how effective the labels are in reducing environmental impact on the production side (Blackman & Rivera, 2010).

How certification/eco-labelling drives environmental improvements at producer level has been studied in long-term studies comparing the environmental impact of individual farmers/fishers before and after certification (e.g. Gutiérrez et al., 2012) and also in cross-sectional studies comparing certified with non-certified producers (e.g. Rueda et al., 2014). The majority of the studies published in this field are of relatively low quality, as the long-term studies do not adequately analyse the impact on the environment if agriculture/cultivation/fisheries were not certified. An overview study that compiled the results of previous research focusing on the effects of the certification of timber, coffee, fish and seafood, bananas and nuts showed positive effects in 23 out of 30 studies (Chaplin-Kramer, et al., 2015), but with the proviso that the majority of the studies did not include an appropriate control group. There are also a number of studies, for example Seufert et al. (2012), that have focused specifically on when and to what extent organic certification leads to environmental benefits. The research shows that organic farming has advantages in terms of biodiversity and soil quality, while the results in certain areas such as climate impact are similar to those for conventionally cultivated products (Seufert & Ramankutti, 2017).

One approach to evaluate the effectiveness of eco-labelling is to look at the proportion of all food sold that is labelled as organic. In Sweden, 9% of total food sold was labelled organic in 2019 (Ekofeb, 2020), which is one of the highest market shares in the world. In Sweden, about 25% of all fish and shellfish sold are also eco-labelled (in 2015, Ziegler & Bergman, 2017). However, although a large proportion of Swedish consumers value the environment highly, sales of eco-labelled foods are limited because consumers value taste, origin, price and shelf life (best-before date) higher than that a product is organic/eco labelled (Magnusson et al., 2001, Swedish Food Agency, 2014). Positive labelling therefore has some but limited policy effectiveness. Eco-labelling has been criticised for being comparatively ineffectual in helping the consumer make the best choices because it (potentially) points out the best choice within a given product category (for example, one fish versus another fish) but does not aim to help consumers reduce their consumption of the most environmentally damaging product categories, or products that are particularly problematic from an environmental point of view, such as red meat, air-freight food, or products that have caused tropical rainforest deforestation (Jonell et al., 2013).

Private actors such as the retail sector, the catering industry and the food industry also play a key role for sales of eco-labelled foods through how these foods are marketed, priced and displayed in groceries and supermarkets. One example is how big chains like Walmart and McDonalds have used the MSC ecolabel to ensure that the fish they sell adhere to a

certain level of environmental sustainability (Lubchenko, et al., 2016), while relatively few consumers recognise the label or actively look for it (Jonell, et al.); 2016).

Negative labelling

Research has suggested that negative information that signals some kind of 'danger' can be more effective than positive labelling that signals an added value with the product. An example of negative labelling can be found in Chile, where compulsory labelling of unhealthy foods in the form of warning symbols has been introduced (Figure 3) on foods with a high content of sugar, unhealthy fat, salt and calorie (Reyes, et al., 2019). Labelling has been combined with restrictions on how these products are allowed to be marketed and sold to children, and in addition, the country has a tax on sugar-sweetened beverages which was raised from 13 to 18% in 2004 (Taillie et al., 2020). A number of countries, including Mexico, Uruguay, Brazil, Peru, Canada and Israel, have introduced or plan to introduce similar warning symbols on food packaging (Reyes et al., 2019).

The labelling initiative in Chile was introduced in 2016 and so far few studies have been published on the effectiveness of negative labelling combined with restrictions on marketing and sales to children. Taillie et al. (2020) however, showed that the sales of beverages with a high calorie or sugar content have fallen by almost 25%. Concerning people's attitudes to negative labelling, an interview study in Chile before and after the introduction of the labelling (2012 and 2016) showed that people became more positive to the labelling over time, while the understanding of what the labelling means remained low and did not change over time (Gregori et al., 2019). A qualitative study involving mothers of children aged 2–14 years showed an in general a positive attitude to the labelling initiative and how it is being used (Correa et al., 2019).

A number of research studies have shown that consumers react differently to positive and

Figure 3: Negative labelling in Chile of foods with a high sugar, unhealthy fat, salt and calorie content. Source: Wikimedia commons https://upload.wikimedia.org/wikipedia/commons/7/7e/Etiquetado_minsal_Chile.jpeg

negative labelling on food packaging (Biel & Grankvist, 2010, van Dam & de Jonge, 2015). Grankvist et al. (2004) for example showed that consumers who were moderately concerned about negative environmental impacts from food production were more susceptible to negative labelling. However, those who were already more concerned about the environmental impact of food were more positively disposed to positive labelling, for example, current eco-labels.

Negative labelling signalling a big environmental footprint would, however, most likely be criticised by the companies producing these goods. The cost-effectiveness of this kind of instrument is also not known. However, tentative results from Chile show a high potential impact and acceptance, especially in combination with restricted marketing and a tax on sugar-sweetened beverages.

> Research has suggested that negative information that signals some kind of 'danger' with the product can be more effective than positive labelling that signals an added value with the product"

Mandatory declaration of environmental footprints

Declaring the environmental impact of a product, referred to as its environmental footprint, is one way of trying to shift consumer behaviour. Various initiatives to put a carbon label on food products has been introduced in a number of countries, including the United Kingdom where the Carbon Trust was the first to introduce this kind of labelling in 2007; and in France where the state pilot-tested mandatory climate labelling (Grenelle II Law, Liu, et al., 2016). Other countries that have voluntary labelling and where the state has been involved in the process in some way include Japan, Germany, Australia, Taiwan and South Korea (Liu et al., 2016). There are also companies that, on their own initiative, declare the climate impact of their products directly on the food package g (for example, Oatly and Quorn) or parts of their assortment as retailers (for example, mat. se).

A conceivable form of state regulation could be mandatory on-package labelling of the environmental footprint for a certain product, similar to the EU's mandatory energy labelling.[5] The energy label has been regarded as a successful initiative given that about 90% of all refrigerators, dishwashers and washing machines achieved the highest grade eight years after this labelling became mandatory, and that the labelling has thus driven a change in production (European Commission, 2010). This labelling is in the form of a multilevel label and has been considered to be as more effective than if only a single figure is communicated (Upham et al., 2011; Thøgersen & Nielsen, 2016). According to the January agreement (a 73 point policy agreement between the Social Democratic Party and Green Party coalition that secured support from the two centre-right parties, the Liberals and the Centre Party so that a government could be formed in Sweden), a mandatory climate declaration for long-distance journeys is to be introduced in Sweden (Transport Analysis, 2020).

> Since there are goal conflicts between different aspects of sustainability,a one-sided focus on the climate issue risks exacerbating the situation in other areas"

A number of studies have been carried out in the area of consumers and climate labelling. Most of these are intervention studies where e.g. products are labelled with their carbon footprint and the impact on consumer choice is investigated. At a university restaurant, it was found that climate labelling in the form of red, yellow and green (traffic light) symbols resulted in only a marginal decrease in sales of meals with a high climate impact and a slight increase in sales of vegetarian food (Brunner et al., 2018). In total, emissions from food served at the restaurant decreased by 3.6% during the period studied. The long-term effects are, however, unclear. Vanclay et al. (2011) labelled goods in a grocery store with green, yellow and black symbols, the latter representing the biggest carbon footprint. The results showed a 6% decrease in sales of black-labelled products and a 4% increase in green-labelled products. However, the experiment was limited to certain product groups (such as milk and canned tomatoes). In a study that focused on fish and other seafood and environmental sustainability in a broader sense (e.g. whether the fish came from sustainable fish stocks or was farmed sustainably), products were labelled red for 'worst choice' (unsustainable), yellow for 'proceed with caution', and green for 'best' choice (Hallstein & Villas-Boas, 2013). Surprisingly, the results showed that sales of all fish decreased, including those with the green label. The authors' analysis was that when negative information is communicated, it might be important to combine it with positive information about other areas of sustainability; in this case, e.g. the positive impacts on health of eating fish and seafood.

[5] Labelling from A to G depending on the energy efficiency of an appliance.

A new study focusing on Swedish consumers' attitudes to climate labelling showed that most were positive to climate labelling, but that one third did not want information about the climate impact of food (Edenbrandt et al., 2020). Furthermore, results from the same study that also included a purchasing experiment showed that those who are positive to climate labelling reduced the climate impact from their purchasing choices by 32%. An overview study of peoples' attitudes to a range of sustainability labels (including positive labels such as eco-labels) demonstrated positive attitudes to eco-labels and, in particular, labels indicating organic production, probably due to the anticipated positive effects on peoples' health (Tobi et al., 2019). The same study showed a generally negative attitude to environmental declarations in the form of carbon footprint (only figures provided). According to the authors, a possible explanation could be a lack of knowledge about the approximate greenhouse gas emissions of various products.

Labelling food with greenhouse gas emissions per kg of product, either as a figure or as a given level on a scale, presents a number of technical challenges. Life cycle assessment, which is generally the method used to generate environmental footprints, is time-consuming and the results can vary according to the methods chosen. In addition, climate impact is the most widely used environmental dimension, since the methods for assessing greenhouse gas emissions are the most widely accepted. This means that other important sustainability dimensions, such as biodiversity; nutrient leakage; water, land and pesticide use; impacting the quality of agricultural land; animal welfare; social aspects etc., are not included, which are included in broader certification programs, for example for organic farming. Since there can be trade-offs between different aspects of sustainability, a one-sided focus on the climate issue risks exacerbating the situation in other areas. The EU's *Product Environmental Footprint (PEF)* initiative is a proposal for a common methodology for calculating the environmental footprint of products using a life cycle approach. Given that all of 16 environmental dimensions are included and that efforts are being made to harmonise the methodology for calculating environmental impact, the initiative can be an important piece of the puzzle in arriving at a comprehensive environmental declaration. So far, however, only a few food categories have been approved in the pilot phase and methodology development for key foods such as meat has been discontinued.[6]

Information campaigns

Large-scale information campaigns aimed at changing consumer behaviour have, together with educational efforts, probably been the most common method used to get people to eat differently. In Italy and the United Kingdom there have been information campaigns to reduce salt consumption and in Denmark and Poland to increase consumption of seafood (Capacci et al., 2012). In Sweden, the association *Mjölkpropagandan* (Milk promotion) was formed in 1923, which,

[6] https://ec.europa.eu/environment/eussd/smgp/ef_pilots.htm

> Information campaigns are rarely sufficient to change behaviour on a large scale, especially in the case of food consumption, an area where people can be particularly sensitive to being preached at"

using state funding, conducted campaigns to increase milk consumption (see Jönsson, 2005) and in most European countries there have been campaigns to increase fruit and vegetable consumption. With the exception of the Swedish Food Agency's campaign to reduce food waste (2017–2019), we have not found any examples of large-scale public information campaigns aimed at reducing the negative environmental impact of food consumption. However, there are examples from the public sector where information has been provided in school dining rooms about the environmental impact of food (for example, Tulläng Upper Secondary School in Örebro[7]). Major government information campaigns recently conducted in Sweden have instead focused on, for example, the spread of infections (for example, 'Wash your hands' in connection with the COVID-19 outbreak in spring 2020).

There are few rigorous evaluations of the impact of information campaigns on human behaviour. Many information campaigns that have aimed to change people's food consumption from a health perspective have been evaluated, but most have not involved a control group (Capacci et al., 2012). The results show that although there is a temporary increase in the level of knowledge in the community, there is only weak evidence that people change their behaviour significantly, or for the effectiveness of the campaigns in terms of health indicators such as body weight or cholesterol levels (Capacci et al., 2012). There are many important barriers for changing habits (McKenzie-Mohr, 2000). Some examples mentioned in the scientific literature are an excess of information (Horne, 2009; Neumann, et al., 2012) and consumer confusion (Chen & Chang, 2013). From an international perspective, information campaigns continue to be among the most common ways of trying to change human behaviour. One reason is that they are relatively easy to implement. Studies show that the public has a relatively positive attitude to information as a policy mechanism (Fesenfeld, et al., 2020; Kwon, et al., 2019).

Although information campaigns probably have limited policy effectiveness in steering people towards more environmentally sustainable food consumption, a basic awareness and information about a problem – here the negative environmental impact of food – can be important for enabling consumers to make informed choices (Gifford & Nilsson, 2014). Research shows that public knowledge of food production and its climate impact is limited and that there is a tendency to underestimate the climate impact of food production in relation to other activities such as travel and accommodation (Bailey, et al., 2014). However, there is reason to believe that this knowledge has increased partly due to the increased attention in recent years on the environmental impacts of food.

To summarise, information campaigns are rarely sufficient to change human behaviour on a large scale, especially in the case of food consumption, an area where people can be particularly sensitive to being preached at. However, information campaigns and continuous information (see for example dietary advice in the next section) can be an important building block for achieving a certain basic level of public knowledge about food, the environment and health. Potentially, this knowledge base could help to change attitudes and norms and promote greater acceptance of other forms of regulation such as taxes and choice editing (cf. Bord et al., 2000).

[7] Tulläng Upper Secondary School in Örebro: www.svt.se/nyheter/lokalt/orebro/vegetarisk-mat-pa-tullangsskolan

Consumer guides and dietary advice

Another type of information outside the food environment is information that consumers themselves must seek out. WWF Sweden's Meat Guide[8], a number of fish guides and various types of recommendations in book and digital form are concrete examples. Few scientific evaluations of how and if these are used by consumers to make more informed choices have been found (Spendrup et al., 2017). However, the WWF's Fish Guide is used by the retail sector to create internal policy documents on which fish and shellfish should be sold (Lindahl & Jonell, 2020).

An example provided by the state is the Swedish Food Agency's *Eating habits and dietary guidelines*[9] which aims primarily at providing guidance when it comes to choosing healthy food, but also to a certain extent deals with the environmental impact of food (Fischer & Garnett, 2016; Figure 2). As for the other consumer guides, we have found no evidence-based information on how much these dietary guidelines are used by the public and how effective they are in changing behaviour. One can note however that prevailing food habits are not in line with these advisories – less than one fifth of the population eat as much fruit, vegetables and whole grains as the advisories prescribe (Riksmaten 2010–11, Amcoff, et al., 2012). Except for the guidance from the Swedish Food Agency, the state currently does not provide any consumer guidance aimed at informing consumers about the environmental impact of food. The Swedish Food Agency offers a food database with nutritional data for different foods. The Agency uses this database when they produce dietary advice for the public and the public sector, and to establish the legitimacy of the Agency's recommendations. A database summarising the best available data on the environmental impact of different foods could be a valuable contribution – for interested members of the public but perhaps even more so for public and private enterprises and other actors. However, there are a number of challenges associated with establishing and using this kind of database. One is that the environmental dimensions that are easy to measure and include in a database (e.g. climate impacts) risk overshadowing other sustainability dimensions that need to be illustrated quantitatively (see section on mandatory environmental declaration, page 18), and that a systems perspective on food security is lost. In addition, it can be expensive to calculate the environmental impact of a large number of foods at a detailed level, and the uncertainties in these calculations are considerable. It is also important that initiatives do not stop at producing environmental data for different foods, but that there also are targets and guidelines on how the data should be used in an effective way to steer the society towards more environmentally sustainable habits.

In summary, it can be assumed that consumer guides and dietary advice are used to a limited extent by individuals[10], but can be important in that they provide easily accessible information about the environment and health that is backed by the state. In addition, they may have indirect positive effects when they are used by key players in the food system, thereby influencing the individual's choices through, for example, choice editing. Given that dietary advice and other guides provide information that consumers have to actively seek out for themselves, the level of acceptance can be assumed to be high – only those consumers who are interested in the information need to read it. More research into policy effectiveness, costs and acceptance of guides and dietary advice, especially where the state is the information owner, could increase knowledge of how such instruments can be used in the best way.

[8] www.wwf.se/mat-och-jordbruk/kottguiden

[9] https://www.livsmedelsverket.se/en/food-habits-health-and-environment/dietary-guidelines

[10] However, the Swedish Food Agency's dietary advice for meals provided within the public sector is used by Sweden's local government actors (municipalities and regions) to plan healthy and nutritious sustainable meals in the health care system, schools and residential care (see the section "Environmental criteria and guidelines for meals provided within the public sector".

Training of school chefs and other key actors

Although eating habits can change throughout life, there is scientific evidence that consumption habits created in our younger years are an important explanatory factor for future eating habits (de Wild et al., 2015, Craigie et al., 2011). For this reason, school meals can play an important role in ultimately steering the population towards more sustainable food consumption. For example, an experimental study in Finland showed that children in the intermediate level of compulsory school who had to taste a sample of vegetables weekly for ten weeks reported after this repeated exposure that they liked vegetables they had previously disliked (Lakkakula, et al., 2010). Getting more children to eat more plant-based foods in preschool and at school can therefore be important for reducing the general population's consumption of animal products in the long term. Knowledge of how food is produced and cooked can also be taught at young ages to stimulate healthier and more sustainable eating habits (Whiteley & Matwiejczyk, 2015).

The food being tasty and appealing is a key factor if it is to be experienced as tempting and attractive to both children and adults (Steptoe et al., 1995). Improving the skills of preschool and school chefs in vegetarian cooking can therefore be an important piece of the puzzle in a shift to sustainable food consumption, as limited knowledge of how to cook tasty plant-based meals is a well-known barrier (Graça, et al. 2019). In Sweden, there are several initiatives in both the public and private sectors aimed at increasing skills in vegetarian cooking and knowledge of sustainable foods, such as the City of Helsingborg's *SmartMat Hbg*[11]. An example from Denmark is *Copenhagen's Madhus*[12] which uses chef training to increase the proportion of organic foods in public sector kitchens from 35 to 72% without increasing costs. In addition, in the Västra Götaland Region in

Although eating habits can change throughout life, there is scientific evidence that consumption habits created in our younger years are an important explanatory factor for future eating habits"

Sweden, an initiative is offering key players in the retail sector training in climate-smart food consumption[13] which indicates that there is some political support for implementing this type of measure.

We have not found any scientific literature on the training of chefs or other educational initiatives for staff to steer the population towards more environmentally sustainable food consumption. However, a number of studies have been published in the area of health, for example the *Live Well program (LiveWell@School Food Initiative)*, which has had the aim of reducing obesity among school pupils in Colorado, USA (Schober et al., 2016); and the *Chef Initiative* in Boston where a professional chef trained staff in school cafeterias and developed new, healthier recipes (Cohen et al., 2012). Both of these initiatives have shown positive results, but more studies are needed to evaluate their effects in the long-term.

Educational tools

In Sweden today there are a number of initiatives which aim to help educators to increase pupils' knowledge about food and its environmental impact. Swedish initiatives include the Swedish Food Agency's project *Hej Skolmat*[14] which has suggested lesson plans and teacher guides revolving around school mealtimes. The most recent initiatives are

[11] https://helsingborg.se/forskola-och-utbildning/helsingborgs-stads-skolor/skolmat/smartmat-hbg

[12] www.kbhmadhus.dk

[13] www.klimat2030.se/klimatsmartmat

[14] www.utbudet.se/storage/ma/dcb10a64a5d140b7b4f9803b53fb6a1e/52bcd24c9e3c437087837c8c73b9bbd8/pdf/C3069E77513D8C5896EB4F6EF6BA2869DB5C4759/Hej%20skolmat.pdf

the Swedish Board of Agriculture's *Maträtt*[15] (about how food is produced and how choices in the supermarket impact environmental sustainability); and – from an interest group organisation – the Federation of Swedish Farmers' (LRF) *Bonden i skolan*[16] about what farmers do and where food in Sweden comes from. Both of these initiatives focus on knowledge about how food is produced rather than on consumption and the environment. However, the use of these initiatives has not been scientifically evaluated. The Sapere method[17] should also be mentioned, as it aims to encourage children to taste and feel many different kinds of food and to put words to tastes and experiences. One goal is to make children more open to new tastes and textures, such as vegetables.

In the health field, a number of studies have evaluated how educational tools can be used to change the eating habits of children and young people from a health perspective. A review of 49 earlier studies evaluated various strategies including, for example, traditional education, parental involvement, literary role models, games or web-based interventions, and experience-based interventions. Traditional education initiatives, often combined with parental involvement, was the most common strategy for getting young people to eat more vegetables and also had positive effects. However, these were not as effective as experience-based teaching strategies (e.g. participation in growing vegetables in the school yard or cooking), which were those that proved most effective in switching to a higher consumption of fruit and vegetables among children up to 11 years old (Dudley, et al., 2015).

[15] https://jordbruksverket.se/om-jordbruksverket/laromedel-och-pedagogiskt-material

[16] www.bondeniskolan.se

[17] www.livsmedelsverket.se/globalassets/publikationsdatabas/broschyrer/sapere_livsmedelsverket_a4-mindre.pdf

Nudging in public or private restaurants

Nudging is about using a variety of tools that are based on knowledge about human behaviour to design choice situations in a way that will encourage a certain behaviour (Thaler & Sunstein, 2008). Examples of such tools include using default choices, making changes to the physical environment, or using information to remind people of social or personal norms. Because this type of intervention happens in the actual choice situation, nudging is mainly relevant in restaurants and shops, for example to highlight a more environment-friendly lunch by letting the vegetarian option be the 'lunch special' or highlighting vegetable protein sources through their placement in shops.

A number of articles and books have been published that clarify in detail what nudging is and how it can be used (see for example Thaler & Sunstein, 2008; Sugden, 2009; Sunstein, 2014). There are also a number of reviews of intervention studies that have been carried out and which evaluate the potential of using nudging for environmental purposes (see for example Mont et al., 2014; Lindahl & Stikvoort, 2015; Lehner et al., 2016; Gravert & Carlsson, 2019). All in all, they show that relatively few evaluations have been made of initiatives linked to sustainable food consumption. On the other hand, there are many studies that are linked to health (see for example Bucher et al., 2016; Wilson et al., 2016; Glanz & Yaroch, 2004 for literature reviews).

Since the focus of this report is on policy instruments that can be implemented by the state and other governmental decision-makers, we have focused on nudging in the context of the public sector meal. But we also highlight initiatives that can be implemented by private sector actors (restaurants and shops) since they can be encouraged or requested by a state actor.

Perhaps the best known tool used for nudging is to use default choices that play on people's tendency to 'go along with' the default choice rather than making an active choice because it saves them time and mental effort. People

> Making alternatives visible is also an example of nudging"

might also think that the default choice is a recommendation from someone who knows more (Reisch & Sunstein, 2013). The fact that a vegetarian dish is the 'lunch special' or that the consumer must explicitly ask for the meat dish is an example of this. In a randomised experiment at a restaurant in Gothenburg, Gravert and Kurz (2019) compared how many fewer meat dishes were ordered and sold during a period when the menu was designed in this way (vegetarian and fish dishes as the default choices) compared to a menu where the consumer had to ask for the vegetarian option (meat and fish dishes as the default choices) and found that a significantly lower proportion of meat dishes (25%) were sold when the customer had to actively ask for it.

Making alternatives more or less visible is also an example of nudging, for example by changing the order in which dishes are presented in buffets or presented in menus. Kurz (2018) evaluated the increased visibility of a vegetarian dish on the menu at a lunch restaurant in a university area in Gothenburg. She found a 6% increase in sales of the vegetarian option.

You can also make changes in the physical environment, for example reducing the size of the plate in order to reduce the amount of food waste. An evaluation of this kind of initiative in hotel restaurants showed a reduction in food waste of about 20%, despite nothing preventing guests from refilling their plates many times (Kallbekken & Sælen, 2013). Measures to reduce food waste have also been tested in schools in Sweden. But this was done with the aid of reminders about the reasons for reducing food waste, or through continuous feedback on measured food waste at the school (Gravert & Carlsson, 2019). Even though a slight decrease could be seen over time in these experiments compared to the control group where no intervention was made, this decrease was not significant. A number of explanations were discussed by the authors. It may have been the case that these interventions cannot get pupils to change their behaviour, or that all pupils reduced their food waste, whether they were in the control group or not. It may also have been that the sample in the study was simply too small – more schools would have been needed in order to measure significant differences . Another reason could be of course that the intervention was not sufficient to reduce food waste, which could be linked to short lunch breaks, a stressful environment and other external factors. It is also important to point out that the biggest food waste in schools is not what is termed plate waste, i.e. what pupils themselves throw away, but occurs during the cooking and serving of the food (Swedish Food Agency, 2020).

Pre-ordering a meal can operate as a nudge by helping consumers stick to their intentions to keep to a more environment-friendly diet. Examples can be pre-ordering ready-made lunches in schools or other public sector contexts. An intervention study by Miller, et al. (2016) evaluated this form of nudging – an online pre-order system as a possible way to make schoolchildren in Florida eat a healthier diet. The pupils were divided into three groups. The first group was not given the opportunity to pre-order their meals, the second group could pre-order their meals, and the third group could pre-order their meals and also received recommendations for healthy meals. They found that the pupils who could pre-order their meals chose significantly more fruit, an increase of 28% (51% in the group that received recommendations), and significantly more vegetables, an increase of 16% (30% with recommendations) compared to the control group that could not pre-order. This result shows that this kind of nudge (a pre-order, with or without recommendations) could also have an impact in the environmental area, but this is of course not certain. No scientific evaluation from the environmental point of view has been found. Meal-kits containing the ingredients for a certain number of vegetarian meals can be seen as another example in this category. A

comparison of such food boxes available on the Swedish market[18] shows that most of the sellers offer some form of plant-based food box, which can be interpreted as a demand for and acceptance by consumers of this type of nudge.

Nudging in shops

Shopping for food in supermarkets usually means choosing products based on habits. If people make an active decision, it is often made quickly and based on only a limited amount of information. For example, there is research that shows that consumers often only weigh in one or two factors, for example taste and price, or price and health impact (Kalnikaité et al., 2013). Using nudging in shops and supermarkets to influence consumers to make choices that reduce their environmental impact can therefore be a challenge if there are other competing campaigns and offers (Cadario & Chandon, 2019; Lehner, 2015). Especially when it's about using information tools.

However, it is well known that the way products are placed and presented in the shop is important for breaking habits and influencing what the consumer chooses. For every shop owner, a key factor is precisely the design and layout of the shop, the way shelves are placed, in what arrangements and what products are temporarily highlighted. Because this affects not only the consumer's shopping experience but also what is actually purchased (Juel-Jacobsen, 2015). For example, shops often use product placement and offers to emphasise and highlight certain products (Nordfält, 2011; Nordfält & Lange, 2013). Consumers in turn see these products as chance bargains they do not want to miss out on, even though they did not originally intend to buy them (Chevalier, 1975). The use of tools such as product placement to steer consumers towards more environmentally sustainable choices therefore ought to be relatively effective. There is a documented example from the Netherlands where chain of shops managed to double sales of vegetarian cold cuts by placing them next to the animal equivalent (when previously the products were placed at different locations in the shop). In the same shops, they also managed to reduce sales of sausages by 20% by adding smaller portions as an alternative (without any increase in sales of other meat products).[19] However, there are no scientific evaluations of this example and of other similar initiatives.

Another way to influence consumers in shops is to use information as a reminder of the consumer's values; that they are an environment-friendly consumer. The idea is therefore to influence the consumer by means of a subtle reminder of how the consumer intends to behave. Such tools have a potentially greater impact in online shops where the customer is exposed to less 'noise' during the shopping. Climate declarations for foods[20] online filters to help the consumer choose, for example, organic or Swedish-produced, already exist in Sweden's retail sector today. Feedback to reward and strengthen more environment-friendly consumption is another example of a nudge that can be applied to help customers reduce the environmental impact of their food consumption. Today, for example, Swedish supermarket chain ICA's customers have this option with Mitt klimatmål [My Climate Goal].[21] Mat.se has also carried out a pilot study using this kind of feedback, but there are no scientific evaluations.

If the state is to encourage private actors to use nudging, however, there may be goal conflicts between national environmental and health objectives and the profit interests of businesses. This makes it difficult to check whether consumers are being guided in the interests of society or the business. If nudging is used to maximise profits rather than to help consumers make choices on the basis of their

[18] www.matkasse.se/vegetarisk

[19] www.behavioraleconomics.com/a-nudge-in-the-green-direction

[20] Mat.se has a system whereby products are marked with their climate impact and at the time of purchase the consumer also receives suggestions for an equivalent product with a lower climate impact than the one they have selected. However, it is at the pilot stage and has not been evaluated in any scientific study.

[21] www.ica.se/appar-och-tjanster/klimatmal

vested interests or in the interests of society, it is called sludging (Thaler, 2018). As well as being able to encourage nudging, the state should actively oppose sludging, for example by regulating certain types of shelf displays and marketing (see the section on regulation and requirements, page 34).

Knowledge and support: Summarising discussion

The research clearly shows that information alone is not enough to stimulate major behavioural changes. However, information can be key to building knowledge and greater awareness of environmental and food issues. For example, the reduction in meat consumption in Sweden over the past three years (Swedish Board of Agriculture, 2020) can probably be explained in part by information campaigns from non-governmental organisations and consequently increased awareness among the population. Positive eco-labelling which signals that a food product is better from an environmental point of view (e.g. KRAV and MSC) can have some effect on consumer behaviour and on the climate impact of producers. One limitation, however, is that eco-labelling only helps consumers to make the potentially best choice in a particular category of products (e.g. one kind of beef versus another kind of beef) but does not affect major consumption changes, such as from red meat to seafood or vegetarian alternatives. However, certifications and labels can be a valuable mechanism for market actors who want to opt out of products with a large environmental footprint or specifically promote better products (see, for example, Hållbar livsmedelskedja [sustainable agri-food chain][22] which is coordinated by WWF).

The state requiring negative labelling and mandatory environmental declarations (possibly in combination with a health label) are stronger forms of information-based policy instruments. Although there is great uncertainty about the outcome of using negative information on packaging that

> Information alone is not enough to stimulate major behavioural changes."

signals a high environmental impact, Chile's warning labelling of unhealthy foods is promising, and has shown preliminary good effects. Consumers show some scepticism about environmental declarations directly on food packaging, especially when it comes to climate footprint communicated as a figure. A hierarchical labelling where the impact of a product is communicated in the form of different levels (for example, traffic lights) can be more effective and has some potential for changing consumer behaviour. However, there are a number of challenges. Firstly, this kind of labelling usually includes only one environmental dimension (e.g. climate), while excluding other environmental impacts. Secondly, a national negative labelling scheme or environmental declaration on all foods would be a technically demanding process and would require significant investment to achieve rigorous and credible labelling. Thirdly, as a general rule, environmental aspects are low on the consumer's priority list and there is an immediate risk that negative labelling/environmental declarations are less effective than labelling systems that communicate health information. If labelling were to act as an incentive for industry to reduce the negative impact of food on the environment (such as the Keyhole or the EU's energy labelling), the chances of substantial change in the right direction are good.

One instrument that is still relatively untried in Sweden, but that could drive change "bottom-up" is teaching key actors in the agri-food chain about food and the environment. Training chefs to improve their skills in preparing tasty and appealing plant-based food seems able to have a positive effect on people's eating habits (de Wild et al., 2015, Craigie et al., 2011). In addition, fun-filled and new-old educational approaches such as school vegetable gardens and cooking

[22] https://hallbarlivsmedelskedja.se

have been shown to connect children and young people with food production in their early years and are thus effective in making children and young people eat more fruit and vegetables and in increasing knowledge generally about food and health (Dudley et al., 2015).

Steering through knowledge and support can also be based on actors utilising nudging techniques to nudge people towards more sustainable choices. There is currently broad acceptance for these types of initiatives and they do not entail any significant costs (Petrascu et al., 2016, Hagman et al., 2015). In the case of sustainable food consumption, there are relatively few intervention studies to learn from and the studies that have been carried out and have been evaluated show very different magnitudes of effect (Gravert & Carlsson, 2019). There is therefore a need for more studies and evaluations, first a smaller scale before it is implemented on a larger scale. There is also criticism of the use of nudging. For example, it has been pointed out that there is an immediate risk that nudging can suppress the public's acceptance of stricter instruments because they can give false hope that environmental problems can be dealt with without major costs or interventions (Hagmann et al., 2019). Another criticism that has been raised is that we cannot be sure that those who use nudging have the individual's interests (health), or the public's interests (the environment), in mind (Sugden, 2009). In the case of food consumption, this criticism comes to a head when those who design our choice situations are private actors with a vested interest in focus.

In summary, we can see that steering solely through knowledge and support cannot be expected to lead to the significant changes in food consumption that are needed. On the other hand, we can see instruments in this category as important elements of a transition towards more sustainable food consumption and necessary to enable behavioural changes, to spread knowledge and awareness, and thus to progress towards a norm change that is necessary if we want to drastically reduce the environmental impact of our food consumption.

Policy instruments in the category changed relative prices

Economic instruments targeting consumers are primarily about changing relative prices between goods, i.e., how the prices of different goods relate to each other, thus redirecting consumption and reducing external effects such as negative health and environmental impacts. Excise taxes are common on non-food products to manage their environmental damage costs (such as taxes on energy), but also for health-related costs (such as taxes on tobacco and alcohol). It is also in the area of health that we find the most examples of taxes introduced to deal with adverse health effects of food consumption, primarily taxes on sugar and saturated fat. One example is the sugar tax in Mexico, where the consumption of soft drinks has decreased by an average of 8% on an annual basis since the tax was introduced (Colchero et al., 2017). Subsidies are not as common, but the reduction in VAT on certain commodity groups such as books and other cultural products and services in Sweden (6% instead of 25%) in practice amounts to a subsidy, as does the reduction in VAT on food in general (12% instead of 25%). In some countries, VAT is different for different foods, for example in the United Kingdom most foods are exempt from VAT, while products such as ice cream, candy and soft drinks are subject to VAT of 20%.[23]

Taxes: Consumer price increases

When it comes to economic instruments to reduce the environmental impact of food consumption, taxes on meat and dairy products are the most widely examined instrument in the literature. Climate-related taxes to reduce greenhouse gas emissions from meat and dairy products is discussed in Wirsenius et al. (2011), Säll & Gren (2015) and Jansson & Säll (2018) for example. A simulation study showed that a climate tax on all Swedish food, based on the previous CO_2 tax of SEK 1.15 per kg CO_2 equivalents (CO_2e), can result in emissions reductions of up to 200 kg CO_2 per person per year (equivalent to about 10% of food emissions and 2% of total emissions per person). The decrease was mainly a result of reduced consumption of beef and other animal-derived products (Säll et al., 2020). Similar results can be found in Springmann et al. (2017). Jansson and Säll (2018), on the other hand, examined what the outcome would be with a greenhouse gas emissions tax of EUR 290 per tonne of CO_2e (about SEK 2.9 per kg of CO_2e) on the consumption of animal products in the EU and found a potential emissions reduction of 5% in the EU, and a reduction of 0.75% globally. The major difference in potential emissions reductions in Jansson and Säll (2018) is due to the fact that this study includes global trade and the potential in agriculture for changes in production, which other studies do not take into account. A few studies also include more environmental aspects, such as eutrophication, and show that if the costs of eutrophication are included in tax levels, the potential emissions reductions increase by a few percentage points (Säll & Gren, 2015).

Most studies simulate the effects of taxes, which means that no emissions reduction target has been set when calculating their effects. By setting a target for a specific reduction in emissions instead, and using optimisation studies, you can determine the level of taxation that would be needed to reduce emissions by a certain amount. There are a few studies that approach optimisation, mainly by simulating for different tax levels. For example, Edjabou & Smed (2013) found that taxes that are six to seven times higher than the current Swedish CO_2 tax might be required to change Danish consumption so that emissions would be reduced by 20%.

[23] www.gov.uk/guidance/rates-of-vat-on-different-goods-and-services

Taxes are cost-effective if the price paid for the environmental damage (the tax) is the same for all who cause the damage, since the emissions reduction will then occur where it is cheapest to reduce emissions. However, Jansson & Säll (2018) argue that it is expensive to reduce emissions by means of consumption taxes when the cost that arises in the form of reduced consumer welfare is included, i.e., when costs for the consumer in the form of increased prices are included.[24] If these costs are compared with the costs arising from policy instruments on the production side (such as direct taxes on emissions or emission allowances), taxes on consumption are likely to be more expensive per reduced tonne of emissions and result in a reduced number of animals rather than other technical measures. Thus, overall, when the costs to the consumer in terms of increased prices are compared with taxes on actual emissions, it is probably cheaper to tax emissions directly within agriculture. However, we have not found any empirical studies that analyse this.

However, the technical possibilities for reducing emissions from meat production are limited. Therefore, a reduction in the number of animals as a result of reduced consumption of animal products is an important climate measure. Differentiated taxes based on production methods could be a means of reducing the number of animals from the least sustainable production systems. One example could be higher taxes on beef produced on recently cleared rainforest land and lower taxes on beef raised on natural pastures that contribute to biodiversity. However, the effects of such variants have not been sufficiently investigated in the literature and there may also be legal challenges in trade agreements and the like. Other variants of price increases could include the removal of subsidies on environmentally damaging products such as milk subsidies for schools and preschools.[25]

[24] The study measured reduced equivalent variation (EV) – a measure of economic welfare (measured in money) of how consumers experience changes in welfare when prices change.

[25] https://jordbruksverket.se/stod/livsmedel/skolmjolksstod

Differentiated taxes based on production methods could be a means of reducing the number of animals from the least sustainable production systems."

In general, consumption patterns are not much changed in relation to changes in food prices due to low price sensitivity among consumers (Säll et al., 2020). In order to achieve a 10% change in the consumption of beef, for example, a price increase of up to 20 to 30% could be necessary. However, income from environmental taxes can be used for environmental initiatives, for example to promote sustainable food consumption or production, thereby further reducing emissions. A tax on meat equivalent to the CO_2 tax for example would burden households by around SEK 1000 per person per year and generate income to the state of nearly SEK 9 billion (Säll, 2018).

There are few studies concerning public acceptance of economic instruments in the particular area of sustainability and food consumption. A recently published article containing survey data from the USA, China and Germany, shows, however, that acceptance of policy instruments that involve direct costs for consumers (such as a tax on meat) is lower than for information instruments (Fesenfeld, et al., 2020).

Studies from both Sweden (Harring, 2020) and other countries (Vanhonacker, et al., 2012; de Groeve & Bleys, 2017) also show that those who often consume meat are more negatively disposed to economic instruments to reduce climate impact aimed at reducing meat consumption than those who eat meat less frequently. Gender, education level, age and ideology also affect support for a climate tax on meat. Women, those with higher education, young people and those on the left of the political spectrum are more positively disposed. Place of residence has also been shown to have significance for acceptance

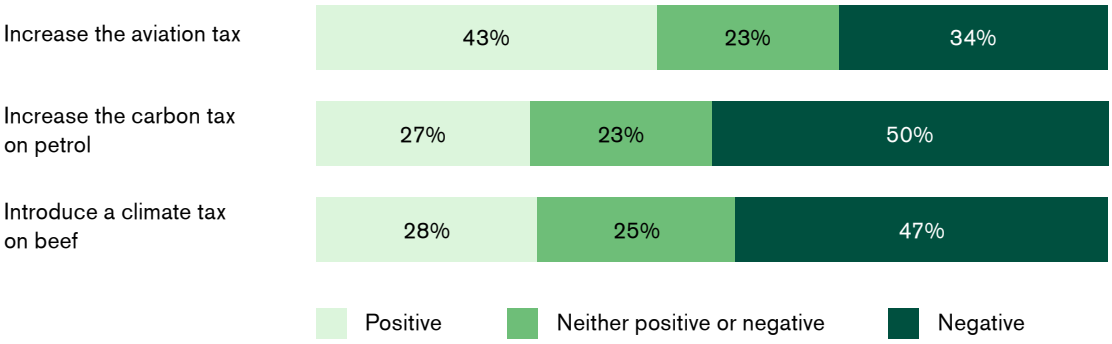

Figure 4: Attitudes in Sweden towards the proposal to introduce a climate tax on beef, compared to attitudes towards the proposal to increase the CO_2 tax on petrol, and increase the aviation tax, 2019 (%). Source: The national SOM survey 2019. Previously published in Harring, 2020.

Comment: The question posed was: 'What is your opinion about the following proposals?' Followed by the following proposals: 'Introduce a climate tax on beef', 'raise the CO_2 tax on petrol', and 'increase the aviation tax'. The questions were answered on a five-point scale: 1 (very good proposal), 2 (quite good proposal), 3 (neither good nor bad proposal), 4 (rather bad proposal), 5 (very bad proposal). A positive response refers to values 1–2, neither positive nor negative response refers to value 3, and a negative response values 4–5.

of this type of policy instrument (Nässen & Larsson, 2015; Grimsrud et al., 2019; Harring, 2020). Those who live in rural areas are much more negatively disposed than those living in a large city, while income levels seem to play less of a role.

A survey by SOM Institute in Gothenburg shows that more Swedes are negatively disposed (47%) than positively disposed (27%) to the proposal to 'introduce a climate tax on beef' (Figure 4). If we compare attitudes to other taxes, we find that the public opinion runs along the same lines in relation to the proposal to 'increase the CO_2 tax on petrol'. However, a significant number of Swedes are positive (43%) to the proposal to increase aviation taxes.

Subsidies: Consumer price reductions

There are few studies that have looked at how subsidies might encourage consumers to switch to more environment-friendly food. It is likely that the lack of studies is because, according to economic theory, products are mainly subsidized on the basis of their positive external effects and not because they have lower negative effects. Few foods contribute to positive external effects in terms of environmental impact, but some examples include pollination from bees that produce honey, the maintenance of natural pasture land by grazing animals and nitrogen fixation from legumes. If subsidies at the consumer level are to have an effect on environmental impact, the products consumers reject in favour of the subsidised product must represent a higher negative impact; otherwise subsidies to reduce emissions may even be counter-productive. Even if the subsidy gets people to buy more of a more sustainable product, it does not mean that they are choosing the more sustainable product as an alternative to a product associated with high emissions; there is a risk that subsidies will therefore lead to increased consumption. For

> Increases in meat prices do not necessarily lead to increased consumption of fruit and vegetables."

this reason, it is difficult to talk about policy effectiveness. The lower VAT rate applied to food in Sweden can be seen as a subsidy and leads to a higher proportion of consumer expenditure being spent on food than would have been the case if the standard VAT rate had applied.

Simply introducing subsidies on more sustainable food in Sweden has a presumed small effect on the environmental impact of food, and may potentially increase the environmental impact of food through increased total consumption, including increased food waste. The demand for fruit and vegetables, for example, is less price sensitive than the demand for meat, dairy and fish products and the consumption of fruit and vegetables is affected very little by how high or low the consumption of meat is (Säll et al., 2020). This means that increases in meat prices do not necessarily lead to increased consumption of fruit and vegetables. Legumes are sustainable and protein-rich substitutes for animal products, but the price levels of legumes are already low in relation to meat and demand would probably not be significantly affected by price reductions. Subsidies applied to individual food groups can also have unanticipated effects. Nordström and Thunström (2009) investigated subsidies for increasing fibre intake from grains in Sweden. However, the results showed that as fibre intake increases, so does consumption of fat, salt and sugar, and that a tax on other products may be needed to mitigate this undesirable effect. Subsidising plant-based meat and dairy substitutes, which are currently relatively expensive, might lead more people to choose them instead of animal products, but there is no research in this area. It is likely that food subsidies would entail high costs for the state and thus indirect high costs per reduced tonne of greenhouse gases.

Change in relative prices: Summarising discussion

In order to influence food consumption, the state can introduce economic instruments to establish changes in relative prices between sustainable and unsustainable foods. The demand for food is not particularly sensitive to price changes and in order to achieve significant reductions in the consumption of, for example, beef (down to a few kg per person per year in Sweden), a tax of just over SEK 8 per kg of CO_2e would be necessary (Säll et al., 2020). This would correspond to a tax of approximately SEK 200 per kg of average beef, which is probably too high to be politically viable. However, a similar estimate for the transport sector from the Swedish Transport Administration, based on the penalty charge for companies that do not meet their reduction obligation, has estimated that the CO_2 tax would have to be SEK 7 per kg CO_2e, which is in the same order of magnitude.

An alternative that could be both effective and potentially viable is a bonus-malus system through VAT differentiation based on the environmental burden of different products, i.e. that VAT would be increased on animal-based foods and food from tropical, deforested areas, while VAT on fruit and vegetables from Sweden and Europe for example would be reduced. Similar systems are used in other industries, including the passenger car fleet in Sweden.[26] Combining taxes with subsidies would likely increase acceptance for economic instruments, as this kind of system could be designed so that the net costs to consumers are low or zero. A bonus-malus system could also be based on health-related differences, for example by having low VAT on Keyhole labelled food and higher VAT on all other foods. However, more research is needed into the effects of combined policy instruments and there are methodological challenges to capturing all the relevant sustainability aspects in the pricing, i.e., not just climate but also health aspects, biodiversity, antibiotic usage and social and economic aspects.

[26] www.transportstyrelsen.se/bonusmalus

A key aspect of using taxes to steer demand is how the state chooses to use the resulting tax revenues. In both Germany and the United States, public acceptance of a certain tax increase was higher when combined with either a reduction in aid to meat producers, a reduction in income tax, or the earmarking of resources for reforms that benefit low-income earners (Fesenfeld, et al., 2020; see also Grimsrud, et al., 2019). Tax revenues can also finance environmental initiatives in agriculture (Gren, et al., 2021). All in all, it can be concluded that price-based mechanisms for changing behaviour are highly unlikely to create sufficiently significant changes in consumption, but that combined taxes and subsidies could be an important cog in transitioning the food system as a whole.

Finally, it is worth pointing out that the simulation studies of the effects of changes in relative prices discussed above only estimated the impact of changes in prices based on estimates of how price and demand interact. But taxes or subsidies may also have other effects. For example, they may have a symbolic effect because they show that the state is taking negative external impacts seriously and the level of tax is an indicator of how much, for example, global warming is costing the society. Thus, price instruments can also potentially make a contribution to influencing social norms around food consumption in a more sustainable direction. However, estimating the size of these effects is very difficult, since it requires actually implementing this type of instrument and then managing to isolate the various effects of the price changes on consumption over a longer period of time.

Combining taxes with subsidies would likely increase acceptance for economic instruments”

Policy instruments in the category of regulation and requirements

Food production is subject to many environmental laws and regulations. In agriculture, for example, there are laws governing which plant protection products may be used, how and when fertilizer may be applied, and how animals are to be kept. However, there are currently no laws or regulations whose primary aim is steering the public towards more environmentally sustainable food consumption. Examples of such regulations could be laws regulating availability of foods with a high environmental impact and regulations governing the marketing of such foods, just like Sweden currently has laws on how alcohol and tobacco may be sold and marketed. We can also envisage banning foodstuffs with a high environmental impact, just as we have banned incandescent light bulbs, for example. It is also possible to regulate the type of food that can be served in publicly funded activities and the requirements to be imposed in tenders and purchases for public sector kitchens. Requirements targeting the retail sector to improve the sustainability of food sold is another type of instrument that could be introduced.

We have not found any scientific studies that have dealt with environmental regulation of food consumption. On the other hand, many studies have analysed the relationship between the availability and marketing of foods and health-related outcomes such as obesity or increased consumption of unhealthy foods. Measures to reduce the overconsumption of food are also positive from an environmental point of view, since they reduce what is termed metabolic waste, i.e., the "waste" that occurs from eating more than one needs (Toti et al., 2019).

Regulation of choice

As far as we know, there is no state regulation of the choice of foods offered for environmental reasons. For health reasons, however, there are some examples. For example, Scotland is planning to introduce regulations on how certain unhealthy foods are displayed in shops, as well as banning high-volume discounts and unlimited consumption at buffets.[27] The most obvious example in Sweden in terms of regulation of supply is, of course, Systembolaget (Sweden's government-owned chain of liquor stores). Through Systembolaget the Swedish state by whom, when and where alcoholic beverages can be bought (only to those above the age of 20 years old in special stores closing at 7 pm and closed on Sundays). Previously, there was also an industry agreement, between the Swedish Consumer Agency and many actors in retail, not to display sweets close to the checkouts. However, due to non-compliance with the agreement, it was abandoned in 2011 (SBU, 2017). Another example of regulation in the health field is Sweden's Education Act requirement to provide nutritious school meals which was introduced in 2011.[28]

Many studies have investigated the relationship between obesity and the local food environment[29] in and around a residential area. Often these are cross-sectional studies that have analysed the correlation between the incidence of obesity and availability of places for food purchases, such as fast food restaurants and supermarkets. The results of such studies have been summarised in a number of systematic overview studies (for example, Caitlin et al., 2012; Cobb et al., 2015; Fleischhacker et al., 2011). Although a

[27] www.gov.scot/news/improving-scotlands-diet

[28] www.skolverket.se/skolutveckling/inspiration-och-stod-i-arbetet/stod-i-arbetet/mat-i-forskolan-och-skolan

[29] The local food environment constitutes physical access to food that people have in an area. This might include proximity to supermarkets and various types of restaurants and other places where food can be purchased.

large number of studies have been conducted, the results are not clear and only weak evidence for a relationship between obesity and the food environment has been found. The quality of many of the studies included in the overview studies is low, so the results should be interpreted with caution. Cobb et al. (2015) provided the following explanations for why no stronger link has been found: 1) the size of the effect is too small for it to be captured in the small samples used and given the methodological limitations of many of the studies; 2) it is not possible to isolate the effect of the food environment from other factors affecting, for example, obesity; and 3) studying only the food environment close to the home (as most of these studies are limited to) does not capture everything that people are exposed to.

Other studies have explored how the incidence of obesity is impacted by the availability of unhealthy foods in particular environments. For example, Chriqui et al. (2014) investigated in a systematic literature review of 24 studies the relationship between state laws in the United States regulating the availability of food offered in school environments and student BMI, and their consumption of and access to unhealthy food, It was found that the existence of laws was related to the availability of unhealthy food and beverages. As regards the relationship to BMI, the results were more mixed.

Another way to regulate choice is to regulate packaging size. In New York, an attempt was made to introduce a regulation that prevented sales of soft drinks in packs larger than half a litre. The proposal had great support but soft drinks companies opposed the proposal and it was never introduced after a ruling in the Supreme Court that the proposal was outside the scope of what the city could legislate on (Pratt, 2015). Although research has shown clear links between portion size and energy intake, few studies have investigated the effectiveness of different types of interventions in terms of limiting portion size (Steenhuis & Poelman, 2017). However, one example is Crino et al. (2017) who found that a reduction in portion size and the calorie content of soft drinks in Australia would result in significant cost savings and health benefits.

Another way to regulate choice is to regulate packaging size”

Obviously, if a food is not available on the market, its consumption is hindered. A complete ban on environmentally harmful food is therefore naturally a very effective policy instrument. Regulating and thus editing choice in different ways also affects consumption. Support for this kind of relationship is greatest for display of foods in shops, while this becomes more diffuse for what are termed food environments (Swedish Agency for Public Management, 2019).

No studies of public acceptance of bans specifically aimed at steering the public towards more sustainable food consumption have been found. However, an international study of public acceptance of regulations in the health area in five countries (Australia, Canada, Mexico, the United Kingdom and the United States) shows relatively weak support for bans and restrictions compared to, for example, subsidies for healthy food, or information campaigns. However, this varies from country to country and support for “a ban on marketing unhealthy food and beverages to children” and “requirement for water or milk to be default options on children’s menus in fast food restaurants” get relatively strong support compared to other policy instruments (Kwon et al., 2019).

Consumption allowances for meat

Emissions trading is currently used as a policy to reduce greenhouse gas emissions. However, the agricultural sector is excluded from the European trading scheme, EU ETS. If agriculture were to be included, there is a high risk that emissions-intensive food production would move from the EU and emissions reductions would be less than if, for example, taxes on food consumption were

introduced (see section on taxes, page 28) (van Doorslaer et al., 2015). An alternative system to taxation, influenced by emissions trading, is a rationing system involving trade with allowances to consume certain foods that have a high environmental impact, such as meat. Such a system would be an effective policy instrument, as production and consumption would be limited to achieve the agreed emissions reductions. In addition, trading schemes with allowances are cost-effective as a policy instrument as any reduction in emissions will ultimately occur where it is cheapest. In this case, it would mean that consumers with the highest willingness to pay would be the ones who consume meat and the reduction in consumer welfare would thus be as small as possible given the reduction in consumption occurring.

This kind of policy instrument is foreign to today's society, but theoretically possible. However, there are a number of issues that would need to be resolved in order to introduce such a system, such as how to run the system in practise (perhaps using some form of physical or electronic rationing coupons) and how to control the system to avoid a black market. Studies of acceptance for similar instruments in the field of aviation show that they have low public acceptance (Larsson et al., 2020).

Regulation of marketing

Only a few countries have special rules restricting the marketing of unhealthy foods (OPC, 2018). Chile has statutory labelling requirements for foods containing a certain level of sugar, saturated fat, salt and calories and has also introduced restrictions on the marketing of certain products (Taillie et al., 2020). For example, beverages with a high sugar content and "non-essential" products with a high calorie content must not be marketed to children under the age of 14. The law is relatively new (2016) and needs to be evaluated, but initial studies have shown a significant decrease (24%) in sales of these beverages (Taillie et al., 2020). In the province of Quebec, Canada, in principle all marketing aimed at children under 13 years of age has

Only a few countries have special rules restricting the marketing of unhealthy foods"

been prohibited since the 1970s (Swedish Agency for Public Management, 2019). In Sweden, advertising for tobacco and alcohol products is not permitted and TV advertising and product placement targeting children under the age of 12 are also banned. However, these rules do not apply to television broadcast from other countries (Swedish Consumer Agency, 2020). Through the International Chamber of Commerce (ICC)[30], the business community has its own marketing guidelines (especially for children), but nothing specific about unhealthy (or unsustainable) foods. Many companies also have their own guidelines on marketing to children, such as not marketing sweets and similar products to children under 12 years (Swedish Agency for Public Management, 2019).

Concerning marketing regulations, many studies have explored the connections between different types of marketing and food consumption. The results from individual studies have been summarised in a number of systematic overview studies. A report from the Swedish Agency for Public Management (2019) summarises the state of knowledge regarding the relationship between the marketing of unhealthy food and its consumption. In the case of children, the research shows clear links (for example, Cairns et al., 2009; Harris et al., 2009). In the case of adults, considerably fewer studies have been carried out and the results are less clear (Mills et al., 2013). This does not mean that there are no links – it may simply be the case that current research has not been able to establish them. The quality of these studies varies considerably. Although many are randomised intervention studies, the majority

[30] A coalition of six million enterprises and industry associations from 100 countries.

of the studies have shortcomings in their randomisation, the number of participants is small, and only a few foods have been included in the studies (Mills et al., 2013).

The difference in effect between children and adults can be partly explained by the intellectual capacity of adults to resist the temptation of advertising messages. However, today's extensive marketing of food products aimed at adults would not exist if it was not effective. This suggests that statutory regulation of this marketing would probably have an effect. In addition, research shows that legislation limiting marketing has a greater impact than through industry agreements (Swedish Agency for Public Management, 2019). Galbraith-Emami & Lobstein (2013) write that when scientific studies have evaluated how well voluntary agreements to restrict advertising worked, they found low compliance with a continued high intensity of advertising for unhealthy food. The effect is greatest if many different types of media are included in the agreement (TV, newspapers, social media, etc.) and it is combined with other measures designed to steer consumers towards healthier eating patterns.

Requirements for improved sustainability of food sold

In the automotive sector, statutory regulation is used to reduce average emissions from cars sold at a certain pace and car manufacturers must pay sanction charges if the target is not met. In the United States, this policy instrument is called CAFE – Corporate Average Fuel Economy (Kiso, 2019). The EU equivalent is a mandatory emissions target for new cars and the requirement was set at 95 grams of CO_2 per kilometre by 2020[31]. Similarly, gradually increasing sustainability requirements on food sold in the retail sector could be a potential instrument. The retail sector is well placed to influence producers as well as consumers for example through the selection of products in their advertising, displays in shops, choice editing, changes in pricing, etc. These could be used to a much greater extent to steer consumers towards more sustainable food consumption.

In theory, targets/requirements relating to many different aspects of sustainability, including climate, biodiversity, health and social aspects could be envisaged. In order for instruments such as these to be feasible and have high legitimacy, it is important that the targets/requirements can be followed up in a way that is trustworthy, administratively simple, and transparent. The possibilities for doing this are relatively good when it comes to the climate impact of food sold. There are established lists of climate impact per kg for different product categories, for example RISE's open list[32] or Moberg et al. (2019). Potential climate indicators for total sales for a retailer could be average gram CO_2e per kg sold food, or to relate it to the shop's total sales in monetary terms – the indicator then being tonnes CO_2e per million EURO. For other environmental aspects, however, the challenges are greater because data on the impact of individual products on biodiversity for example are not as easy to capture. One risk of only following up climate impact is that other important aspects of sustainability are side-lined or even made worse. One way to avoid this problem is to use a number of indicators that capture several aspects. The UK project *Plating Up Progress*[33] suggests a number of such indicators, for example "% of basket that are animal products (meat, fish, dairy, eggs)" and "% of shopping basket meeting agreed nutritional standard". In Sweden, for example, the latter could be based on The Swedish National Food Agency's Keyhole label on healthy food[34].

Key indicators for improved sustainability of food sold can be applied in different ways. To begin with, they could be used as an internal tool in businesses for setting targets (Danielsson, 2020). Another variant

[31] https://ec.europa.eu/clima/policies/transport/vehicles/cars_en

[32] https://www.ri.se/en/our-stories/foundation-climate-smarter-food-consumption

[33] https://foodfoundation.org.uk/wp-content/uploads/2019/08/Plating-up-Progress_Report2_DIGITAL.pdf

[34] https://www.livsmedelsverket.se/en/food-and-content/labelling/nyckelhalet

> In order to reduce the environmental impact, there need to be requirements at the point of procurement, but it is also important that purchases of contracted foods use low environmental impact procedures"

is voluntary industry agreements where retail trade, in cooperation with government agencies, could agree on a common industry target and on how to measure and report progress towards its achievement. In this case, the agreement on halving food waste could serve as a model[35] (see also Stenmarck, et al., 2020). If there is political debate about statutory requirements, the chances of an industry self-regulating might increase as a way of avoiding being subject to legal requirements, and this can be seen as a form of quasi-regulation (Héritier & Eckert, 2008). However, to establish this as a powerful policy instrument, statutory requirements on the extent of emissions reductions and sanctions for companies that do not comply with the requirements are needed.

The idea of a policy instrument requiring improved sustainability for food sold is new and there is no specific research into this. In general, however, it can be said that the policy effectiveness of this type of regulatory instrument could be high, but would depend on the extent of the improvements that politicians decide on. Public acceptance for this type of instrument aimed at businesses rather than consumers is normally also relatively high (Harring et al., 2019).

Guidelines and environmental criteria for public sector meal services

It is common in both Sweden and the EU to use environmental criteria in public procurement and in purchasing food and meal services, for example in schools and hospitals (Swedish Competition Authority, 2015; Grausne & Quetel, 2018; Neto, 2020). In order to reduce the environmental impact, there need to be requirements at the point of procurement, but it is also important that purchases of contracted foods use low environmental impact procedures. A survey from the Swedish Food Agency sent to Sweden's municipalities (Grausne & Quetel, 2018) showed that about 60% have a meal policy with sections on how environmental impact can be reduced, for example through choice of foods. The meal policies almost always include a reference to the Swedish Food Agency's advice/guidelines for public meals[36], which shows that they are functioning as an instrument to steer public meal services towards environmental sustainability. These policies commonly steer the services towards a reduction in the proportion of meat and one third of the municipalities stated that they monitor the climate impact of the public meals. Criteria on the proportions of organic food are also common. In 2018, the proportion of organic food in public sector purchasing was 38% (Ekomatcentrum, 2019).

There is plenty of literature with advice on how to conduct procurements with environmental requirements, both generally and specifically for food and meal services (see, for example, the National Agency for Public Procurement, 2016; the European Committee for the Regions, 2018).

However, few studies have been carried out investigating the effectiveness and the costs of using procurement as an instrument to reduce environmental impact – both generally speaking and specifically for food and food services (Testa et al., 2012; Lundberg, et al., 2016).

[35] www.livsmedelsverket.se/om-oss/press/nyheter/pressmeddelanden/nationell-overenskommelse-ska-minska-matsvinnet?AspxAutoDetectCookieSupport=1

[36] The Swedish Food Agency's (2019) national recommendations for school meals summarise environmentally sustainable school meals as follows: Waste in the kitchen, when serving and from plates minimised. Food selected that is produced with respect for the environment, animal welfare and social sustainability. Wild-caught fish purchased to come from stable stocks and fished with care for the environment. The proportion of meat is limited and replaced by other protein-rich foods. Fruits and vegetables with long shelf lives selected in the first instance and varied according to the season. Waste recycled, energy consumption and transport minimised.

According to Lundberg et al. (2016), Lundberg and Marklund (2018) and Marron (1997), environmental requirements in public procurement are generally a less effective policy instrument for reducing environmental impact from production compared with direct subsidies to production with a low environmental impact. This is because, among other things, there may be a shift of produce with low environmental impact from the consumer market to the public sector market, resulting in price increases and a reduction in availability to private consumers. Jörgensen (2012) and Lundberg et al. (2016) addressed a number of reasons why procurement is not effective as an instrument for increasing the proportion of organic agriculture, such as the fact that the costs of shifting to organic production, and the waiting period until products from recently shifted farmland are allowed to be marketed as organic , can result in farmers being hesitant to switch their production. Another reason is that the public sector is a relatively small buyer.[37] They believe that direct subsidies to organic production is a more effective instrument. Lundberg et al. (2016) however point out that environmental requirements in public procurement can also have an impact through the public sector acting as a forerunner and sending a signal to private consumers. The studies above are mainly based on theoretical models. We have not found any empirical studies that have investigated the effectiveness of public procurement in reducing the environmental impact of food production. Nor have we found any studies on the acceptance of environmental criteria in public procurement and purchases of food. However, there is research on acceptance of changes in which foods are served in public sector meals, which is addressed in the section on menu restrictions (see page 39).

An assumption in the studies above is that one product is replaced by another product that meets the environmental criteria in the procurement, but is otherwise in principle equivalent, for example that conventional milk is replaced by organic milk. Cerutti et al. (2018) showed in a study of environmental requirements for the public procurement of meal services that, in contrast to this assumption, it is primarily a change in diet that has the potential to reduce the climate impact of food consumption. However, there may be other environmental aspects involved in such exchanges. For example, organic production means a reduction in the use of chemical pesticides and a change from beef from cattle in stalls to natural pasture-grazed beef would be positive for biodiversity.

Procurement can also be used as an instrument to improve sustainability aspects other than lower environmental impact in the production of a specific food. Södertälje and other municipalities have procured shares in Community Supported Agriculture to increase the quantity of locally produced food (Danielsson, 2017). Ödeshög Municipality requires farms that supply food to be able to visit schools and receive farm visits by pupils, which can be used for teaching about food production and also for promoting local production (Ödeshög Municipality, 2020). Another example of a procurement requirement is that a compulsory school in Härryda Municipality purchases food that would otherwise have been discarded as waste by the supplier (Härryda Municipality, 2020).

Menu restrictions

The environmental impact of meals in both public sector and private sector restaurants can be reduced by simply reducing the amount of food with a high environmental impact on the menu. This can be done either by replacing whole dishes (such as through vegetarian days) or by changing recipes to reduce the quantities of foodstuffs that are harmful to the environment. In an experiment with three primary schools in Botkyrka, school lunches were optimised in terms of their climate impact and nutritional content by adjusting the balance between different foodstuffs in the recipes. As a result, climate impact decreased by 40%, with retained nutritional content and

[37] Central government, county councils and municipalities purchased food and meal services for SEK 10 billion in 2013, corresponding to approximately 4% of the total market for food and meal services in Sweden (Swedish Competition Authority, 2015).

11% lower costs. The changed menu did not lead to any significant changes in plate waste, serving waste or how much the children ate. The level of satisfaction with the school lunch provided remained at the same level as before. This indicates good acceptance for a menu change (Eustachio Colombo et al, 2020a).

When the Helsinki compulsory schools introduced one vegetarian day a week, there were initially fewer pupils coming to school lunches, they took less food and threw away more of it. After one semester however, acceptance was roughly the same as for other foods (Lombardini & Lankoski, 2013). In Ghent in Belgium, since 2009 all public meals are vegetarian on Thursdays. Measurements of plate waste demonstrate similar acceptance for vegetarian food and other food (de Keyzer et al., 2012).

However, a study by Milford and Kildal (2019) showed low support for the introduction of a vegetarian day of the week among the Norwegian defence forces. A survey of soldiers showed that many had a negative attitude to vegetarian food and they were not convinced that it was good for their health and the environment. However, there was a certain correlation between the experience of eating vegetarian food in the canteen and having developed a more positive view of vegetarian food since becoming a soldier. This lends some support to menu changes being able to influence eating habits in general. The study also pointed out that the introduction of the vegetarian day had been poorly communicated to the staff of the canteens and the soldiers, and that this could have affected how well the menu change was received. For example, some restaurants chose not to implement it.

A survey study of students in Belgium also showed a more negative attitude to menu changes intended to reduce meat consumption than the studies above where changes actually were implemented indicate. The respondents were mainly negative to restrictive changes, such as only serving meat once a week, compared to for example introducing a sustainability label for the dishes (de Groeve & Bleys, 2017). However, acceptance varied and those who were already very concerned about the environment were more willing to accept environmental instruments targeting animal products.

Research on menu restrictions has largely focused on attitudes and acceptance among diners, while we have not found any studies of policy or cost effectiveness. Much of the research has also focused on reduced meat consumption, but menu restrictions can also have a broader focus. One example of this is the WWF's One Planet Plate initiative, which sets criteria for climate impact and biodiversity [38]. These types of criteria lead to menu restrictions that do not focus on specific foods, but rather limit all foods with a high impact in the selected criteria areas. All in all, the research shows that there is potential for reducing environmental impact by changing what is actually on the menu, but more research is needed on how to implement menu changes in the best way, and what this could mean for general changes in food consumption in the community.

Regulation and requirements: Summarising discussion

Some of the regulations discussed here are about reducing the accessibility of certain foods and limiting how they are displayed in shops. Research in the health area shows a clear link between certain products being offered and their consumption, especially in relation to children. For example, bigger packages lead to increased consumption (Steenhuis & Poelman, 2017) and regulation of soft drink marketing can reduce consumption drastically (Taillie et al., 2020). The effects on adults are more diffuse, but there is no doubt that companies can influence what people buy by the way products are placed in the shop, advertising and price signals.

[38] www.wwf.se/mat-och-jordbruk/one-planet-plate

In Sweden's public sector, a lot of work is already under way to reduce the environmental impact of meal services. The regulatory and requirement-setting instruments currently being used are advice and guidelines, menu restrictions and public procurement requirements. Almost all municipalities with a meal policy refer to the Swedish Food Agency's recommendations for meals in preschools, schools and elderly care. One way of strengthening this instrument would be to make the recommendations mandatory and/or require mandatory follow-up. Swedish law currently requires that school meals are to be nutritious – this could be extended to include requirements that school meals are to be environmentally sustainable as well.

Many schools have introduced one or more mandatory vegetarian days, changed recipes to reduce environmental impact and set clear targets for the proportion of organic products included. Overall, acceptance of these types of menu restrictions seems high and studies from Sweden show that they can be effective in promoting more sustainable eating habits (Eustachio Colombo, 2020a). In addition, school meals can help to establish sustainable and healthy eating habits in children and young people, which can have important long-term effects (de Wild, et al., 2015, Craigie et al., 2011; Milford & Kildal, 2019). However, if these requirements are to be effective, the sustainable food you serve must be tasty and these measures should be communicated to the staff and diners in a well-considered way. Otherwise, the direct and relatively small total benefit of reduced environmental impact achieved by increasing requirements on public meals served can lead to diners feeling forced to adopt a particular diet that they do not like, which can have a greater negative impact through an indirect effect on their private eating habits. To scale up and increase the requirements on what food can be served in publicly funded meal services also requires more investment in the training of chefs, providing information, and launching more experience-based initiatives that may be important for influencing underlying values and attitudes. It is also important that public sector kitchens are given an educational role and that teachers are instructed to teach pupils about sustainable food consumption and given the training required to do this.

There are expectations in Sweden that the public sector should pioneer sustainable development and since public actors have direct control over what is served, it is natural that a lot of focus should be placed on public sector meals in a discussion about public policy instruments to promote sustainable food consumption. There is also an important symbolic value in what the public sector chooses to do. However, it is important to remember that public sector consumption accounts for only a small part of total food consumption (around 4%). In order to achieve sustainability in food consumption, it is therefore crucial that private food consumption is also changed. There are a number of variations in regulations and requirements that could be feasible for the state to implement; from strict consumption allowances for absolute policy effectiveness, to regulating marketing and requiring businesses to gradually improve the sustainability of the products they sell. Concerning marketing, there is even aid available in the EU for marketing meat. Over a three-year period, EUR 71 million was handed out to businesses and organisations for marketing campaigns for meat, inside and outside the EU.[39] One example is the *Gilla Gris* [Like Pork] campaign[40] in which the industry organisation Svenskt kött [Swedish meat] and its Danish counterpart the Danish Agriculture & Food Council received about SEK 24 million to run a marketing campaign aimed at increasing the consumption of pork in the age group 18 to 29 years.[41] A first step in regulating the marketing of less sustainable foods would, of course, be to remove aid for marketing meat.

[39] https://euobserver.com/environment/144364
[40] https://gillagris.se
[41] https://ec.europa.eu/chafea/agri/en/campaigns/love-pork

Discussion and conclusions

The challenge of reducing the environmental impact of food consumption in Sweden is considerable. The consumption of an average Swede gives rise to greenhouse gas emissions equivalent to approximately nine tonnes of CO_2 per person and year, of which about 15% comes from food (Swedish Environmental Protection Agency, 2020). In addition, Swedish food consumption is also associated with considerable negative consequences in other countries, for example extensive use of pesticides and veterinary antibiotics and deforestation in other countries (Cederberg et al., 2019). In Sweden, agricultural areas also have the largest proportion of European Red List species of all landscape types in Sweden (Sweden's environmental objectives, 2020).

There are some signs that consumption habits are slowly beginning to move in the right direction. For example, meat consumption has declined slightly in the last three years (Swedish Board of Agriculture, 2020) and the percentage of people who say that they never eat vegetarian food has decreased (Eustachio Colombo, 2020b). However, the average person in Sweden eats far more meat than studies suggest is sustainable (see for example Willett et al., 2019, Röös et al., 2017), but this varies with sex and age. Men generally eat more meat than women and younger generations more than the elderly (Riksmaten 2010–11, Amcoff, et al., 2012). However, environmentally sustainable food consumption is not only about meat and other animal products, but also about the sustainable production and consumption of vegetables, fruit, legumes and other plant-based foods, as well as fish and shellfish. Environmentally sustainable food consumption is dependent on sustainable food production and to effectively steer the food system towards sustainability requires a holistic approach.

Many have pointed out the role that the food system can play in sustainable development such as that food and agriculture link together most of the UN's 17 sustainable development goals (see for example Müller & Sukhdev, 2018) and the PRINCE project has shown the role of food in meeting the Swedish environmental targets (Swedish Environmental Protection Agency, 2018). Strategies and policy instruments on the consumption and the production side need to pull in the same direction, with a clearer focus on environmental sustainability compared to today. For example, while the transport and industrial sectors are often seen as key to achieving the sustainable development goals, studies have shown the importance of also taking into account emissions from the food sector to achieve climate targets cost effectively (Bryngelsson et al., 2017).

Overall, there are very few examples of states implementing measures to steer food consumption, in particular towards environmentally sustainable diets, which means that knowledge and experience of how such instruments work in practice is limited. A lot of studies have explored the effects and acceptance of individual policy instruments aimed at more environmentally sustainable food consumption, especially in the areas of labelling, nudging and climate taxes. However, empirical studies are missing, in particular of long-term policy impacts and scientific evaluations of public and private sector initiatives. Among the studies we have identified, most are cross-sectional or intervention studies of relatively low quality: studies based on small or non-representative samples, experimental studies lacking control groups, and/or studies limited to a specific restaurant or product group. There

Overall, there are very few examples of states implementing measures to steer food consumption and, in particular, to steer food consumption towards an environmentally sustainable diet"

To achieve a comprehensive change in consumption patterns we need norm changes. Historically, there have been several such norm changes in Sweden."

is also a great variation in the number of scientific studies assessing the different policy instruments. In addition, it is important to point out that we have not analysed the legal possibilities for introducing these instruments.

A key aspect of policies for sustainable food consumption is that the policy effectiveness, as it is most often measured in scientific articles, does not capture the indirect and long-term effects of an instrument, such as its impact on social norms or people's own motivation to behave more sustainably. On the one hand, there are claims that regulations could remove intrinsic moral motivations that drive individuals to behave in more environment-friendly ways (Frej & Jegen, 2001; Gneezy et al.,2011). On the other hand, legislation and other public interventions in themselves can act as signals and have normative ambitions and consequences; for example, stricter legislation on smoking in public places in Norway and in restaurants in Sweden have helped to shape new social norms about not smoking indoors (see for example Nyborg, 2003). What we eat is strongly linked to social norms (Robinson et al., 2014; Higgs & Thomas, 2016) and to achieve a comprehensive change in consumption patterns we need norm changes. Historically, there have been several such norm changes in food consumption in Sweden; for decades, for example, a milk promotion association existed in Sweden (*Mjölkpropagandan*) which made milk the obvious choice of beverage with a meal. However, as a result of changes in regulation of the food system in Sweden and changing norms, few adults now drink milk with their meals – water is instead the norm (see for example Jönsson, 2005; Jönsson, 2019). It is thus possible to influence norms through public policy instruments, even though norms are also influenced by many other things, including context; legislation on smoking in Greece has not had the same normative effect as in Sweden and Norway (see Nyborg et al., 2016 and Vardavas et al., 2013). The differences may be due to differences in the perceived legitimacy of the legislation and trust in it – two factors that are highlighted as essential for a state intervention affecting norms (Tyler & Jackson, 2013). The way in which an instrument is perceived by the public affects their expectations concerning how others will react to the new intervention, which in turn will affect their own behaviour (Nyborg et al., 2016). It is difficult to study the long-term effects of policy instruments on social norms and even more difficult to say anything about what effect on norms and behaviours a policy instrument that has not yet been introduced might have.

Based on the current state of knowledge, we have formulated three recommendations for what the state and other public actors could do to accelerate the transition to a more sustainable food system.

1. Intensify work in the public sector

The policy instruments currently used in the public sector, such as public procurement requirements, menu restrictions, training of school chefs, educational tools and nudging in public sector restaurants (see descriptions under each type of instrument) are probably effective in steering the population towards more environmentally sustainable food consumption and may moreover also pave the way for healthier eating habits in children and young people. These instruments are generally not associated with any significant costs and acceptance overall seems high. This means that intensifying work with this type of policy instruments can help to speed up the transition to more sustainable food consumption.

Given that tasty and appealing plant-based food in preschools and schools is a key factor in children and young people learning to like and become accustomed to a more sustainable (plant-based) diet, the government could launch a national training initiative

on food and sustainability for the country's preschool and school chefs. Such an initiative could go hand in hand with tightened menu restrictions in the public sector. Studies conducted at schools in Sweden have shown high acceptance for changes in menus and combining tightened menu requirements with a training and information campaign would likely also gain acceptance among the affected actors (see point 3, page 46). Municipalities could also extend the use of experience-based educational tools such as school vegetable gardens and cooking together, which have shown positive effects on children's consumption of fruit and vegetables. There are good examples from Sweden to learn from, for example how one can combine purchasing food with visits to farms.

One aspect to consider when it comes to educational initiatives on food and sustainability is that there is currently no clear mandate and thus no clear guidelines on how to use mealtimes as an didactic tool. This means that it is up to individual schools or teachers/teacher teams to include food and sustainability as a theme within other school subjects. With a clearer mandate in the school curriculum and improving the skills of teachers (in teacher education), school mealtimes as educational material and the link between food and sustainability could get more space in educational activities and this could create a better context and accord between efforts related to meal services and what the children are learning in their classrooms.

What is covered by "food in the public sector" could also be broadened to include sports facilities, youth recreation centres and various types of fully or partially state funded science centres[42] and other similar facilities where food is served or sold. In this context, requirements could be set on what is offered being in line with national environmental and health objectives, which could directly contribute to more sustainable food consumption. Indoor swimming pools, hospital cafés, etc., serving food in line with diet and environmental guidelines could also influence norms in the longer term and thus potentially have a greater leverage.

Although changes in food consumption in children can have long-term positive effects, food consumption in the public sector only constitutes about 4% of total food consumption. In order to achieve a marked sustainability transformation of the food sector, targets and policy instruments that target private consumption of food are also crucial. The great potential of intensified work in the public sector lies in its symbolic value: that it can provide greater clarity about what is meant by sustainable food consumption; that it can contribute to norm changes; and that it can create greater acceptance for policy instruments that target private food consumption as well.

2. Develop national targets for sustainable food consumption

What we eat is seen as a private matter and many people are hesitant about politics influencing this by means of public policy instruments (Bergman et al., 2019, Mazzocchi et al., 2015). Consequently, introducing targets and policy instruments targeting food consumption can be politically sensitive. However, people's food choices are already influenced a great deal by external factors – not so much by public policies but all the more by prevailing norms and corporate marketing and pricing. By drawing up national targets for sustainable food consumption, which would be adopted by parliament, a common picture of what we are aiming at can be created which in turn can facilitate the implementation of effective policy instruments to encourage more sustainable consumption patterns. Targets in themselves also steer the development since they indicate a clear direction that public and private actors can relate their actions to.

Because different groups and organisations in the food sector and in the community have different focuses and objectives, such as

[42] www.skolverket.se/skolutveckling/inspiration-och-stod-i-arbetet/stod-i-arbetet/science-center

> Targets in themselves also steer choices since they indicate a clear direction that public and private actors can relate their actions to"

rural development, increased employment, improved public health, conservation of biodiversity, reduced climate impact, etc., views on what sustainable food consumption is vary, and it can turn out to be difficult to establish common targets that would have broad support in the parliament, within the agricultural sector, and with the general public. One way forward on this issue could be to link the environment more clearly to public health[43], that is, to take a holistic approach to the issue of sustainable food consumption. Often, better health and reduced environmental impact from food go hand in hand. Overconsumption of food is an obvious example, which leads both to overweight and unnecessary environmental load. Reducing the consumption of red meat benefits both the climate and public health, although it may be even more important from a climate perspective than from a public health perspective. Sometimes there is a risk of goal conflicts such as increased environmental impact in other countries if Swedish animal products are replaced by imported foods. A reduction in red meat consumption may also lead to increased consumption of chicken and fish, which is positive from a climate point of view but which may lead to an increase in other problems, for example, more animals being farmed in intensive production systems and increased use of soybeans for feed, which can cause further deforestation.

Food consumption in Sweden also has a given link to food production in Sweden, although imports and exports also play a major role. In any work to develop targets for food consumption, it is therefore important to take into account not only the environment and health, but also the effects on Sweden's food supply, on employment and the profitability of Sweden's agriculture and food industry and the effects on the landscape and rural areas. A well-considered balance needs to be struck between different aspects of sustainability, which is essentially a political task. However, researchers in a number of disciplines, other experts, and civil society actors can all participate in developing the best possible and most objective decision data in order to develop well-considered consumption targets.

A process for developing national targets for sustainable food consumption – from the health and environmental perspectives – could also lead to a broad debate in society on food and sustainability and hopefully also to a greater consensus. If the Swedish parliament were to adopt quantified national targets for total food consumption in Sweden, there would be greater incentives to implement voluntary undertakings[44] as well as powerful policy instruments to achieve them. In addition, setting targets in itself could act as a push factor for initiatives at local and regional levels, and similarly, investments in research and innovation in themselves could be push factors for change. However, in order to achieve significant improvements in food consumption, new and additional policy instruments need to be introduced.

3. Develop and implement effective and attractive policy packages

The concept of sustainable food consumption is complex and involves a wide range of aspects, including the environment, health, animal welfare, justice and socio-economic aspects. Individual policy instruments alone often have a relatively weak effect and limited ability to steer several aspects of

[43] National targets for food consumption (from a health point of view) have been proposed by the Public Health Agency of Sweden and the Swedish Food Agency. www.folkhalsomyndigheten.se/contentassets/5514b381077f4175b13fca5fe1089abe/forslag-till-atgarder-matvanor-fysiskaktivitet.pdf

[44] See proposals for voluntary commitments in www.folkhalsomyndigheten.se/contentassets/5514b381077f4175b13fca5fe1089abe/forslag-till-atgarder-matvanor-fysiskaktivitet.pdf

sustainability in the desired direction. By using combinations or packages of policy instruments, known goal conflicts can be balanced and policy effectiveness and acceptance can be increased. This report has shown that there are very few examples of policy instruments aimed at more environmentally sustainable food consumption that have actually been implemented in practice. Although there are a lot of scientific studies that have evaluated individual instruments such as labelling, nudging and taxes, there are few studies or proposals as to how to combine packages of instruments in the best way.

A package of instruments for sustainable food consumption could contain several different types of economic, informational and regulatory instruments. It is reasonable that food, like other activities with negative external effects, should bear its own costs – that is, be taxed so that its assessed external costs are covered. However, there may be differences between policy effectiveness and acceptance: effective instruments (e.g. taxes) often encounter more resistance than less effective instruments (such as voluntary labelling or information) (Fesenfeld et al., 2020; Kwon et al., 2019). If the introduction of policy instruments is done gradually or not, how they are named and justified, and how tax revenues from them are used also affect acceptance by the population. In Mexico, for example, the introduction of its sugar tax was combined with a massive information campaign, and in the United Kingdom, the proceeds from the Soft Drinks Levy have been earmarked to support sport for children.[45] The decision to introduce a congestion tax in Stockholm was preceded by a trial period and a referendum, which is an example of how policy instruments can be introduced gradually. In addition, a study carried out in Germany, the United States and China found that the public were more positive to a tax increase on meat and fish if this was combined with other measures, such as a reduction in aid to meat producers, a reduction in income tax or giving subsidies to low-income households (Fesenfeld et al., 2020).

> By using combinations or packages of policy instruments, known goal conflicts can be balanced and policy effectiveness and acceptance can be increased"

In order to speed up the transition to more sustainable food consumption, more knowledge is needed about how policy packages can be designed to be both effective and well-accepted by the general population and key actors in the food system. It is likely that public support for the introduction of environmental taxes on food that is harmful to the environment would increase if they were combined with subsidies on fruit and vegetables, for example, and preceded by a comprehensive information campaign, compared with the introduction of environmental taxes on meat, for example. One variant for internalising some of the external costs of food (here health-related costs) that could be interesting to analyse is differentiation of the value added tax (VAT) based on the Keyhole label, in other words VAT is increased on food that is not Keyhole labelled and reduced for foods that have the Keyhole label (see page 15). This would remove the current indirect subsidy on unhealthy foods, such as soft drinks and sweets.[46] This kind of VAT differentiation exists in other countries, including the United Kingdom. It is reasonable to assume that acceptance for this kind of relative price adjustment would be high, but it needs to be explored. The use of an already existing and well-established health label avoids drawing a potentially tricky line between what

[45] www.gov.uk/government/news/soft-drinks-industry-levy-comes-into-effect

[46] Today food has a reduced VAT (12%) compared to the general VAT which is 25%. https://skatteverket.se/servicelankar/otherlanguages/inenglish/businessesandemployers/startingandrunningaswedishbusiness/declaringtaxesbusinesses/vat/vatratesongoodsandservices.4.676f4884175c97df419255d.html

Policy effectiveness would therefore most likely be enhanced by a package of instruments that prioritises tools that affect the retail sector and the food industry"

constitutes healthy food and what does not. By including environmental aspects in the Keyhole criteria in the longer term, this kind of adjustment of relative prices can also steer the population towards more environmentally sustainable dietary patterns.

Among the information-based policy instruments discussed in this report, labelling is often highlighted as a way to steer people towards more sustainable food choices (see for example Food Strategy and the section on the Farm to Fork strategy below). However, as mentioned above, food labelling is not a particularly effective policy instrument and concerning the choice of meat, which is central to the environmental impact of food, it is often beyond the consumer to be able to navigate through all the relevant environmental aspects, labels and prices (Resare Sahlin, et al., 2019). Too much emphasis on labelling as an instrument for sustainable food consumption risks shifting focus from those actors who, through marketing and pricing, have a major impact on what we eat, that is, the retail sector and the food industry. Policy effectiveness would therefore most likely be enhanced by a package of instruments that prioritises tools that affect these actors, for example through the instruments that in the report we have called 'requirements for improved sustainability of food sold' (see page 37). Nevertheless, if labelling is to be introduced, negative, warning labels are probably the most effective in influencing consumers. Regulating the marketing of foods that have a negative impact on the environment and health can also be part of a package of policy instruments, as well as regulation of choice. The latter kind of regulations could first be introduced in public sector environments, for example in sports facilities and youth recreation centres (see point 1, page 44).

A key aspect of a package of instruments for sustainable food consumption is that policy effectiveness increases when the whole 'policy apparatus' is designed to pull in the same direction. Today, there are contradictions between, for example, the Swedish Food Agency's dietary guidelines, which prescribes reduced meat consumption, and Sweden's national food strategy, which wants to see increased production of meat and dairy products (without specifying that this increase must be offset on the export market if consumption in Sweden is to decrease significantly). One way of harmonising efforts on the consumption and production side could be a policy package that includes higher taxes on food while making simultaneous investments in the production side (i.e., something similar to earmarking) for example, increased grazing support for producers who have animals on land that is important for biodiversity; investments to produce more fruit, vegetables and legumes in Sweden; and various types of investments in value-added production in the animal product sector so that the number of animals can be reduced but sales/employment are maintained. This type of policy package can probably also increase acceptance within the food sector, which is central for achieving support among politicians. Combining policy instruments for sustainable food consumption with measures to create more environmentally and economically sustainable food production in Sweden could possibly also increase acceptance among those who experience taxes as unfair and a restriction on their freedom (see for example Maestre-Andres, et al., 2019; Eriksson, et al., 2007). Studies have shown, for example, that people in rural areas are more negatively towards a climate tax on meat (Harring, 2020; Figure 5). It is not known for certain why, but it may have to do with cultural differences and/or that food production is an agrarian industry and that policy instruments in this area would have a greater impact on rural areas in particular (Harring, 2020). When developing a package of policy instruments to steer people towards

Figure 5: Attitudes to the proposal to introduce a climate tax on beef by place of residence in Sweden, 2019 (%). Source: The national SOM survey 2019. Previously published in Harring, 2020.

Comments: The question posed was: 'What is your opinion about the following proposals?' Followed by the following proposals: 'Introducing a climate tax on beef'. The question was answered on a five-point scale: 1 (very good proposal), 2 (quite good proposal), 3 (neither good nor bad proposal), 4 (rather bad proposal), 5 (very bad proposal). A positive response refers to values 1–2, neither positive nor negative response refers to value 3, and a negative response values 4–5.

reducing the environmental impact of food, it is therefore crucial to investigate and take into account how it might affect different groups, both in terms of income, gender, urban/rural and consumers/producers.

The new EU *Farm to Fork strategy*[47] contains several of the instruments discussed here. Among other things, it aims to introduce a proposal for a legislative framework for sustainable food systems by 2023. This framework will contain a common definition and general principles and requirements for sustainable food systems and sustainable food (see point 2 on national targets, page 45). The framework will also address the responsibilities of different actors in the agri-food chain.

Furthermore, the ambition is to develop an 'EU Code of conduct for responsible business and marketing practice' to increase the availability of healthy and sustainable food at fair prices. The strategy also calls for clear information to be provided to consumers by, for example, harmonising health-related product labelling and developing a framework for sustainability labelling that includes health, climate, other environmental objectives and social aspects. It also highlights investments in sustainable food for meals served in schools, as well as educational messages. Taxes to internalise costs related to resource use, emissions and other environmental impacts are also included. Furthermore, the strategy sets out a number of production targets and efforts such as targets for a reduction in the use of pesticides by 50% and fertilisers by 20% to year 2030, as well as improved animal welfare and reduced use of antimicrobials.

[47] https://ec.europa.eu/food/farm2fork_en

A number of initiatives are also under way in Sweden to both define what a sustainable food system is and compile knowledge about policy instruments for more sustainable food consumption[48]. At the time of writing, there appears to be both in Sweden and in the EU a momentum to steer the population towards more sustainable food consumption. Our assessment is that the next step – based on the knowledge that is now being developed – is to develop, implement and follow up attractive and effective combinations of policy instruments.

> There is sufficient evidence base for the immediate development and implementation of instruments to deal with the climate, environmental and health impacts of food"

Concluding comments

Based on the mapping and analysis carried out for this report, it is clear that there is a need for research on policy instruments for environmentally sustainable food consumption, in particular as regards combinations of different instruments and how instruments for promoting sustainability in terms of both the environment and health can be designed. However, as is pointed out more and more frequently by commentators and researchers in the area (see, for example, Wood, et al., 2019), there is sufficient scientific evidence to warrant the immediate development and introduction of policy instruments to tackle the climate, environmental and health impacts of food. Intensifying efforts in the public sector, developing national targets to set the direction, and developing and implementing effective and attractive policy instrument packages are three ways in which the government could start to act directly. However, we would like to point out that the instruments discussed in this report will probably only be able to achieve some part of the major, transformative change required of the food system in order for it to be in line with the planetary boundaries (see Figure 1, page 10). A key question – which is not addressed in this report – is how the very substantial changes required to achieve a sustainable food system can be achieved. In order to begin answering this question, we believe that it is necessary for public actors to start developing and implementing a variety of policy instruments in practice and to systematically evaluate them. This is where the real need for research lies: in the scientific analysis of large-scale strategies and policy instruments for achieving sustainable food consumption.

[48] Examples of initiatives are the Swedish Government's tasking of the Swedish Board of Agriculture to define what is a sustainable food system (www.klimatanpassning.se/vem-gor-vad/vad-gor-myndigheterna/myndigheternas-regeringsuppdrag-2020-1.157874#cke-a-target-1bd20fc4-5326-4f66-bd1f-e5c589b6bb53), work within the environmental objective area on sustainable consumption (being led by the Swedish Consumer Agency) https://sverigesmiljomal.se/contentassets/f2f66cba53f745398381eb7346a215a6/miljomalsradets-atgardslista-2020.pdf, the research programs Mistra Sustainable Consumption and Mistra Food Futures, and projects to be carried out within the Swedish Environmental Protection Agency's call for proposals on syntheses within sustainable food consumption.

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