Fostering Carbon-Friendly Diets: A Systematic Literature Review on Interventions to Reduce Meat Consumption

1 Introduction and Relevance of the Topic

A reduction of meat consumption and shift to plant-based diets have been identified as crucial for reaching climate targets (Bogueva, Marinova, and Raphaely 2017; Mylan 2018; Pohjolainen et al. 2016; IPCC 2019). More specifically, the livestock sector is responsible for 18 percent of CO2 emissions, 9 percent of total carbon dioxide emissions, 37 percent of methane and 65 percent of nitrous oxide emissions attributable to the production of meat and related animal products. Besides negative impacts on climate, meat production is the major driver of biodiversity loss as 30 percent of the earth's land surface is now occupied by the livestock sector and was once home for wildlife (Steinfeld et al. 2006). Currently, global per capita meat consumption amounts to 43.1 kilogram annually and is expected to increase to 51.7 kilogram until 2030 (Chemnitz 2014). Fostering a more carbon-friendly and less-meat based diet among consumers is challenging because food consumption in general, and meat consumption in particular, is deeply rooted in cultural practices, societal norms and daily habits. Scholarly research has already identified a range of barriers to reducing meat consumption ranging from personal over socio-cultural to political and socio-economic factors (Hoek et al. 2017; Bogueva, Marinova, and Raphaely 2017; de Bakker and Dagevos 2012). There is an increasing call for policy interventions to address these barriers and to facilitate a shift to a more plant-based diet, especially in industrialized countries. Next to more traditional policy measures such as information campaigns, consumer education, incentives, and bans, what has recently gained increasing attention are behaviour-based interventions (so-called "nudges") (Tänzler et al. 2005; Bernatzi et al. 2017; Sunstein 2014). However, evidence in how far these policy measures and interventions are actually effective in reducing meat consumption, is still scarce. Thus, this paper aims to (i) identify and classify effective intervention measures to reduce meat consumption, (ii) identify gaps in scholarly evidence and provide a research agenda to empirically advance to the Sustainable Consumer Behavior Literature, and (iii) provide a knowledge repertoire and thus guidance for evidence-based policy-making and management.

2 Methodology

In this paper we systematically review the existing scholarly literature for effective measures to foster more plant-based diets among consumers. In particular, we aim to distil evidence on how effective various intervention measures are in reducing meat consumption among consumers in industrialized countries. Moreover, the paper helps to identify gaps in scholarly research, highlight opportunities for future studies and provide a reliable knowledgebase for evidence-based policy-making. Empirically, we follow the methodology of a systematic literature review which involves (i) specifying a review question, (ii) defining a search strategy as well as exclusion criteria to build a sample of relevant journal articles, and (iii) analysing and synthesizing the data (Briner and Denyer 2012). The databases Science Direct, Web of Science and SCOPUS are used for the literature search which focuses on international peer-

reviewed journal articles in English, while grey literature such as reports and books are excluded. Additional studies are identified through the snowballing technique by scanning the bibliography of retrieved articles. The literature search resulted in a final sample size of 62 peer-reviewed journal articles. These gathered data are analysed and synthesized making use of the approach of narrative synthesis.

3 Preliminary Findings

The preliminary results of the data analysis indicate that scholarly evidence on the effectiveness of different measures is generally scarce. There is some evidence on the effectiveness of message framing; for instance, studies show that framing the problems pertaining to high meat consumption in the context of animal welfare is more effective than framing it in the context of health or the environment (Cordts, Nitzko, and Spiller 2014; Tian, Hilton, and Becker 2016; Kunst and Hohle 2016; Palomo-Vélez, Tybur, and van Vugt 2018). Moreover, few studies measure the impact of multi-component programs comprising different types of interventions over a longer time period (Amiot et al. 2018; Delichatsios et al. 2001). Another important finding relates to how a reduction in meat consumption is assessed. Our analysis indicates that the majority of studies measure either attitudes towards meat consumption or intentions to reduce meat consumption, rather than actual behaviour change (e.g. Cordts, Nitzko, and Spiller 2014; Palomo-Vélez, Tybur, and van Vugt 2018; Berndsen and Van Der Pligt 2004; Klöckner and Ofstad 2017). If actual consumption behaviour is measured, this happens primarily on a self-reported basis (e.g. Amiot et al. 2018). Moreover, all studies capture only short-term effects of interventions on meat consumption; especially in the case of behaviour-based interventions, what is primarily measured are immediate effects on choice rather than fundamental changes in dietary habits (e.g. Kongsbak et al. 2016; Vandenbroele et al. 2018; Campbell-Arvai, Arvai, and Kalof 2014). Future scholarly research should more strongly focus on investigating more fundamental, long-term effects of specific intervention measures on meat consumption.

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