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Sustainable Consumption by Product Substitution? An Exploration of the Appropriation of Plant-Based 'Mylk' in Everyday Life

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Key Messages

- The increase in mylk consumption cannot be characterised as a simple process of product substitution
- Switching to mylk consumption involves the “recrafting” of practices, especially an engagement of new meanings
- Mylk consumption does not occur evenly in society but is shaped by a range of socio-economic and situational factors
- Mylk and milk consumption are not just a matter of demand but also of supply, shaped by systems of provision

1. Introduction

Diet is gaining increasing attention in debates about sustainability, particularly in relation to the problem of climate change. Food consumption contributes around 14.5% to global anthropogenic emissions (Gerber et al., 2013), of which the beef and dairy sectors are accountable for 60% (Bellarby et al., 2013). Milk and dairy products are an important part of the UK diet, contributing 8% to all energy use from household food and drink (DEFRA, 2017).

The need to reduce the impact of high levels of meat and dairy consumption that characterise Western diets has been noted by numerous scholars (Poore & Nemecek, 2018 ; Springmann et al., 2018; Willett et al., 2019) in the context of international efforts to address climate change (IPCC, 2019). In addition, there has been rising attention to the adverse environmental implications of intensive animal agriculture; ambivalent information about human health effects of dairy milk consumption and increased awareness of the negative links between the dairy industry and animal welfare (Busch et al., 2017; Tsakiridou et al., 2010). One response to the growing body of evidence on these negative impacts, has been to suggest that consumers should reduce intake by substituting meat and dairy with alternative non-animal products, such as non-dairy 'mylk'. We use the term 'mylk' to represent plant-based milk products marketed as replacements for dairy milk. 'Mylk' includes a range of different milk replacement products based on different ingredients (e.g. nuts, legumes, and grains) and processing technologies.

Milk consumption in the UK has almost halved since 1974, and remains on a clear downward trend (DEFRA, 2017). In contrast, consumption of mylk is on the rise. While mylks were still a niche product

a few decades ago (Mylan et al., 2019), almost a quarter of Brits were found to buy mylk over a three-month period in 2019 (Mintel, 2019). Similar trends have been evident in other countries and regions such as the United States (McCarthy et al., 2017) and Europe (Haas et al., 2019).

This raises the question of whether we are witnessing a process of product substitution whereby the use of mylk gradually replaces the consumption of milk. If this was the case, it would fit well with a longstanding line of argument within the field of sustainable consumption, which suggests that individuals can choose to use more efficient products to reduce the footprint of their consumption, while retaining the existing routines and values that underpin their daily life (Cohen & Murphy, 2001; Geels et al., 2015).

However, several previous studies have argued that the adoption of new products is less straightforward than suggested by the idea of product substitution (e.g. Ozaki et al., 2013; Shove et al., 2012; Spurling et al., 2013). Informed by social practice theory and socio-technical studies (e.g. Geels, 2010; Hess & Sovacool, 2020; Latour, 2005), previous research shows that sustainable consumption can be understood as a process of 'co-production' between users and products or technologies. For instance, users often need to amend existing practices when they adopt new products or technologies, for instance by actively engaging new meanings and skills (Ozaki et al., 2013).

In addition, it is likely that the adoption of new products or technologies does not occur uniformly within society, given that consumption is highly socially structured (Bourdieu, 1984; Middlemiss, 2018). Adoption is therefore likely to be shaped by socio-economic characteristics and other situational factors. Further, while product substitution focuses on consumer choice and the demand side of the economy as drivers of sustainable consumption, the supply side, i.e. production or systems of provision (Bayliss & Fine, 2020), is also expected to play an important role in advancing sustainable consumption. The type of goods, and the needs they ultimately fulfil, shape the relationship between production, consumption and the appropriation of products in everyday life (Bayliss & Fine, 2020).

This paper therefore focuses on a single product type, mylk, as a case study to examine processes and roles of product substitution within sustainable consumption. The aim of this paper is to discover whether the increased consumption of plant-based 'mylk', which is marketed as a more sustainable option compared to milk, can be understood as a case of sustainable consumption via product substitution. The paper thus addresses the call made by Morris et al. (2019), to better understand how and why UK consumers are incorporating mylk into their diets, as an underexplored aspect of the phenomenon of rising mylk consumption (Mylan et al 2019). A mixed methods approach is adopted which combines quantitative data from the National Diet and Nutrition Survey (NDNS) with qualitative secondary data from the Mass Observation Archive. The paper combines and interprets this data in relation to the phenomenon of sustainable consumption as product substitution, a purpose for which the data has not previously been used.

Based on the findings from this research, this paper presents an empirically evidenced critique to the position of sustainable consumption via substitution. At first sight, the rapid expansion of mylk, alongside a reduction in milk consumption, appears to confirm product substitution as a viable pathway to reducing the environmental impacts of diet. However, we suggest that this high level 'success story' masks some important dynamics at play, which will have consequences for understanding if, how, and to what extent product substitution can contribute to sustainable consumption. In particular, milk is not simply substituted with mylk as many people choose to consume mylk alongside milk, rather than cutting milk out of their diet entirely. Using mylk instead

of milk often requires the engagement of new, sometimes conflicting, meanings around health and the environment. Furthermore, mylk consumption is shaped by a range of socio-economic and situational factors: people on low incomes or with lower levels of education are far less likely to consume mylk, indicating that the higher price of mylk acts as a barrier. Finally, the analysis demonstrates that it is important to examine systems of mylk provision to understand increased consumption of mylk, as well as remaining barriers to expansion, instead of merely focusing on demand-side factors.

2. Literature review

This work is informed by several bodies of literature. We explain the concept of product substitution and its role in economic analysis, and discuss the relationship between product substitution and sustainable consumption by reviewing ideas on change processes from sustainable consumption and social practices. We comment on the extent to which these ideas have been applied in studies on milk and mylk consumption throughout.

Product substitution refers to the substitution of one product with another, similar product, for instance a substitution of sugar with artificial sweetener, incandescent light bulbs with LED lightbulbs, petrol cars with electric vehicles, etc. The phenomenon of substitution plays an important role in mainstream economics in understanding elasticities of demand: by how much consumer demand decreases in response to an increase of the price of a specific product will partly depend on how substitutable that product is (Chaiton et al., 2020; Harmon, 2019).

How product substitution relates to debates on sustainable consumption, what the process of product substitution involves and how it happens, are less well understood. The sustainable consumption literature has identified that positions of “weak sustainable consumption” (Akenji, 2014; Lorek & Fuchs, 2013) and “reformist sustainable consumption and production” (Geels et al., 2015) assume that environmental targets can be achieved through innovation of products and technology while values, behaviours, consumption levels, and economic systems can remain largely unchanged. Product substitution is what mylk producers seek when they market mylk as different but sufficiently similar to milk, suggesting that mylk can easily work as a replacement product (Lonkila & Kaljonen, 2021).

The ‘weak sustainability’ view has been extensively critiqued by ‘strong sustainability’ scholars, who argue that the core mechanism suggested – relying on consumers to substitute low for high impact products – will not deliver the scale and depth of change required (Akenji, 2014; Lorek & Fuchs, 2013). Strong sustainability scholars argue that far-reaching changes in level and types of production and consumption, as well as in underlying economic systems, are needed to stay within planetary limits (Hobson, 2013; Lorek & Fuchs, 2013; Middlemiss, 2018).

Geels et al. (2015) propose a further position of “reconfiguration” in which changes in both daily life practices *and* wider socio-technical systems are required to achieve environmental targets (ibid.). In this perspective, reconfigured practices and socio-technical systems do not present a complete overhaul of societal “deep structures”, rather, they build on and develop elements of existing practices and systems, enabling social functions to be delivered in new ways. Spurling et al. (2013) take a similar approach, elaborating this by drawing a distinction between “recrafting” and “substituting” practices. Social practices have been conceptualised by Shove et al. (e.g. 2012) as consisting of three main elements: “meanings”, “skills” and “materials”. Meanings circulate in society through the media and in social networks. Meanings also manifest themselves in individuals’

beliefs, attitudes and values. The concept of skills refers to the practical know-how required to engage in a practice. The material element represents the physical things and technologies that are part of practices. A recrafted practice largely maintains a previous practice while individual elements or relationships between elements of the practice change, e.g. by switching from a petrol car to an electric car (Ozaki et al., 2013). In contrast, the substitution of a practice involves greater change of all elements of practice, for instance when riding a bike replaces driving a car.

How do these debates relate to product substitution? The 'weak' and 'reformist' positions suggest that environmental objectives can largely be achieved through simple substitution, i.e. the adoption of less carbon intensive products and technologies, without wider changes in behaviours or systems. Insights from 'reconfiguration' approaches suggest that product substitution is not necessarily so straightforward (Spurling et al., 2013). The extent to which practices need to be 'recrafted' when products are substituted is likely to vary between different products and practices.

Here, we focus on increased consumption of mylk, considering to what extent milk is substituted by mylk, and whether substitution (of the material element of practice) requires an amendment of meanings and skills. Those taking a practice approach suggest that changing diets involves the 'recrafting' of eating practices as it involves developing new meanings and skills (O'Neill et al., 2019; Spurling et al., 2013: 35). We have not found existing research that examines whether increased mylk consumption can be interpreted as a case of product substitution. However, several previous studies examine some of the meanings associated with milk and mylk consumption (Haas et al., 2019; Lonkila & Kaljonen, 2021; McCarthy et al., 2017; Morris et al., 2019; Wiley, 2011). They find that milk tends to be perceived as a 'natural' and healthy product as it contains calcium and other vitamins, while plant-based mylk is preferred by people who have issues with digesting milk, or are concerned about animal welfare and the environmental impact of dairy production.

In addition to examining meanings associated with milk and mylk consumption, we analyse how the adoption of mylk is shaped by socio-economic and situational factors, and systems of mylk provision. The patterning of consumption by socio-economic and situational factors is relevant from a social justice perspective because some people have greater capacity than others to reduce their environmental impacts, although these patterns are complex (Büchs & Schnepf, 2013; Ivanova & Wood, 2020; Middlemiss, 2018). While high income is associated with high carbon behaviours such as driving a car and flying (Büchs & Mattioli, 2021; Gössling et al., 2009; Lucas et al., 2016), high income and high education is also associated with (costly) types of sustainable behaviours such as driving a more energy efficient car (Haustein & Jensen, 2018; Vassileva & Campillo, 2017), installing solar panels (Sigrin et al., 2015; Stewart, 2022) or purchasing organic food (Brył, 2018). When it comes to the adoption of vegetarian diets, previous research has found that non-meat eaters or meat reducers are more likely to be female, young and more educated (Koch et al., 2019; Neff et al., 2018; Pfeiler & Egloff, 2018). Previous qualitative research has also shown that a range of situational factors, especially people's relationships and availability of time, play an important role in shaping energy use and sustainable consumption (Godin & Sahakian, 2018; Middlemiss, 2018: 178-180; Middlemiss et al., 2019). We have not found existing research on the relationship between socio-economic characteristics and other situational factors and the adoption of mylk in the UK.

Finally, scholars have argued that the analysis of (sustainable) consumption cannot be understood by solely focusing on consumer choice and the demand-side of the economy but needs to involve an understanding of production or systems of provision (Bayliss & Fine, 2020; Mattioli et al., 2020; Middlemiss, 2018: ch. 10). Provisioning systems tend to be organised in ways that are beyond consumers' control. They constitute incentives or disincentives for the production and consumption of specific types of goods and services, for example through regulations, policies and financial

support schemes, which in turn influence the availability of milk and mylk, their price, and how these products are packaged, transported, stored and marketed (Fuentes & Fuentes, 2017; Wiley, 2011). Research on milk has emphasised the crucial roles of production and state regulation (including for school milk in the UK) in establishing dairy milk as a common consumer good (Atkins, 2005; Otomo, 2014; Simon, 2013). Policies and financial support schemes differ significantly for milk and mylk production. Mylan (2019) has researched the role of provisioning systems for the rise of mylk consumption and found that the promotion of this 'niche' product by mainstream actors such as supermarkets and mainstream brands such as Danone, Nestlé and Coca-Cola likely contributed to the increase of mylk consumption. In this paper, we examine ways in which systems of mylk provision support the adoption of mylk as reflected in respondent narratives.

3. Methods

3.1 Quantitative data and method

For the quantitative analysis, we utilise the National Diet and Nutrition Survey (NDNS). The survey covers a representative cross-section of the UK population. The individual survey files include a question on whether a respondent has consumed any "rare foods", one option of which is "non-cow's milk", including soya, rice, oat, almond, and coconut milk, as well as dairy milks like goat's and sheep's milk. Based on these variables, we create a dummy variable that indicates whether a respondent consumes mylk or not, coding those who only consumed goat's or sheep's milk as an alternative as 0. Since the option to name specific non-cow's milks was only introduced in 2010/11, we exclude the first two survey rounds of 2008/9 and 2009/10. The person level diary files provide information on whether the respondent consumed dairy milk (skimmed, semi-skimmed, whole or one-percent) in grams. The analysis is based on the merged data files for the individual surveys and the person level diaries from survey years 2010/11 to 2018/19 for individuals aged 16 and over. The resulting sample size is 7,370 individuals. The analysis does not include milk or mylk-based products such as yogurts, cream, cheese, etc.

The analysis examines how the consumption of mylk is distributed across socio-economic groups. We focus on socio-economic characteristics including household income, age, gender, presence of children in the household, education level, health status, and diet. Relationships between mylk consumption and socio-economic characteristics are examined through bivariate analysis based on Chi-squared tests, and multiple logistic regression analysis. The dependent variable is whether an individual consumes mylk, including people consume a mix of mylk and milk.

For the bi-variate analysis, we create income quintiles for which information is available up to year 2015/16. For the regression analysis we use a variable on income tertiles which covers the whole survey period. The original education variable in the NDNS provides the age at which the respondent completed full-time education. We create a dummy variable that is coded 1 if the age of completing full-time education is 19 or over to represent attendance of higher education", and 0 otherwise. The NDNS question on health asks the respondent how they rate their general health on a scale from 1 "very good" to 5 "very bad". We reverse the coding for this variable for the analysis so that 5 stands for "very good" and 1 for "very bad". To correct for sampling and response bias, as well as different population and sample sizes across years, we create a combined weight based on individual year weights provided by the NDNS. The regression analysis excludes regression outliers (standardised residuals <-3 or >3, ca. 1% of all observations).

3.2 Mass Observation data and method

The Mass Observation Archive¹ is a unique qualitative resource that captures qualitative diary-like data on everyday life in Britain. Qualitative prompts, termed ‘directives’, are sent three or four times a year to a non-random sample of volunteer respondents from across the UK, also known as ‘observers’ (Courage, 2019). This method enables an open and authentic response, which results in a variety of mediums used by the observers such as stories, lists, letters, drawings, photographs and memoirs. For the milk Directive, questions about milk consumption were sent to mass observers throughout the UK. The Directive included questions ranging from “what, if any, milk do you regularly buy?” and to the more open-ended prompt “Please share any memories of having milk delivered to your doorstep” (Mass Observation Archive, 2019). Mass Observation respondents are more likely to be female, and over 40 years old, so this is not a representative sample. It does however give an insight into a range of opinions and perspectives.

The Mass Observation Projects team digitised the 111 anonymised milk Directive 2019 responses for the project, enabling safe and protected access to the files online. Some responses consisted of just a paragraph, others were up to 3 sides of typed A4. The data was analysed in NVivo, a qualitative data analysis programme. We adopted a semi-inductive approach to coding the interviews as we started with focusing on explanations of milk choice, especially the ‘meanings’ that respondents attached to milk/mylk consumption, following a social practices approach (Shove et al., 2012). We developed the categories of ‘situational factors’ and ‘provisioning systems’ more inductively, to describe the drivers and barriers to milk/mylk consumption that arise from respondents’ dispositions, economic and relationship circumstances, as well as the role that production and market distribution of products have on consumption. These categories connect the more recent social practices literature with earlier contributions that highlighted the role of unequal distributions of power and resources in shaping social practices (e.g. Giddens, 1984).

Mass Observation Archive (MOA) data has been criticised for its lack of demographic representation (Courage, 2019). Other methodological challenges include blurry or missing details within the sample and the idiosyncratic way that respondents choose to write (Uprichard et al., 2013). Generalisations drawn here are analytical rather than statistical. They do however offer valuable insights into why people consume milk/mylk. Note also that the milk directive did not explicitly ask about milk alternatives. Note that we did not change the spelling of milk/mylk that respondents used in MOA entries. We also left round brackets that respondents used in their entries but signify any changes in the text by us through square brackets.

4. Results

In this section, we report findings on the processes and characteristics of increasing mylk consumption in the UK. We first apply the social practices framework with its three dimensions of material, meanings and skills (Shove et al., 2012) to demonstrate ways in which milk consumption is ‘recrafted’ through the rising appropriation of mylk. We then discuss how the appropriation of mylk in social practices is shaped by socio-economic and situational factors, and hence unevenly distributed in society. In addition to socio-economic factors such as income, education, age, etc., we examine the role of relationships, taste and health conditions as situational factors that help or hinder the appropriation of mylk. Finally, we present results on the ways in which systems of provision of milk and mylk shape the appropriation of mylk in society. Taking this perspective asks

¹ Mass Observation Archive, available at <http://www.massobs.org.uk/>

how systems of provision shape meanings, consumer preferences and choice in the first place, and hence structurally shape options for product substitution and sustainable consumption more widely.

4.1 "Recrafting practices": materials, meanings, skills

4.1.1 Material: trends of mylk consumption

In all years combined, around 19.15% (Std. Error 0.46) of the population aged 16 and over consumed mylk. Consumption of mylk nearly quadrupled over the observation period from 9.0% in 2010/11 to 35.0% in 2018/19, while the percentage of respondents who noted the consumption of cow's milk decreased from 90.0% in 2010/11 to 80.1% in 2018/19 (Fig. 1).

However, the consumption of mylk often coincides with that of milk. On average across the observation period, around 76.0% of respondents who consume mylk also consume milk, and around 16.6% of those who consume milk also consume mylk. On average, only around 4.6% of respondents exclusively consumed mylk. Over time, we see an upward trend in the exclusive consumption of mylk, rising from below 2.0% in 2010/11 to 9.7% in 2018/19 (Fig. 1). The proportion of vegetarians and vegans among those who consume mylk has also increased over time, from 4.1% in 2010/11 to 10.8% in 2018/19, while the proportion of vegetarians and vegans in the whole sample increased from 1.4% to 5.2% over the same period.

[Fig. 1 here, see separate files for titles and notes]

Data from the MOA suggests that 'mixing milks' mainly happens because some people use mylk and milk for different purposes as illustrated in the following quote from an MOA respondent which was one of many examples: "I regularly buy semi-skimmed cow's milk and roasted almond milk, occasionally coconut milk. I drink the non-dairy in my breakfast cereal and have dairy in my coffee" [D4736c]. At the household level, several types of milk may be purchased to cater for different needs and preferences of different household members: "I have tried different types of milk, particularly when I was on a diet, but I cannot give up my cow's milk. I use coconut milk a lot in cooking. I have a son who is unable to tolerate milk and my husband also has (...) milk in cereal" [P6588c].²

4.1.2 Meanings and mylk consumption

The analysis in this section uses MOA data to understand the meanings that respondents associate with milk and mylk consumption. We report meanings here as stated by respondents, we do not discuss the factual correctness of these meanings/beliefs. Meanings related to two themes are discussed here: health and environmental impacts.

Meanings associated with health

People frequently encounter discourses around 'healthy' and 'unhealthy' food, be it through media and advertisement, their social networks or advice they receive from doctors or other professionals. Many MOA respondents expressed views about the healthiness or otherwise of milk and mylk, and often these 'meanings' were given as one of the reasons for their preference. Both benefits and risks for health were mentioned in relation to milk and mylk. The protein, calcium and vitamin content of milk was often referred to as a benefit, e.g.:

² Note, however, that the NDNS data are at the individual level.

“I have never had any problem following this advice [to drink a pint of milk a day], and it was always promoted as a complete food, full of protein and goodness” [A6936abc].

Many respondents were aware that mylks are often fortified with calcium and vitamins and therefore saw milk as the more ‘natural’ product, e.g.:

“None of the plant-based milks have the nutrients found naturally in cow's milk and have to be fortified with additional vitamins and minerals, requiring additional processing” [B3227c].

However, the fat in milk was often seen as problematic and as a potential reason to switch from full fat milk to semi-skimmed milk, or to mylk, e.g.:

“The reason for changing 35 years ago to skimmed milk from full-fat milk was that health concerns were raised then about the consumption of fat in our diets” [M6790abc].

Some respondents expressed hesitation about the consumption of soya milk because of stories they heard about its potential to mimic oestrogen [e.g. N6845].

Meanings associated with environmental impacts

Many MOA respondents mentioned environmental considerations in relation to their milk/mylk consumption. For some, the greenhouse gas impact and animal welfare issues around milk consumption was a reason to switch to plant-based mylks, e.g.:

“Even if I could I don’t think that I would go back to dairy products. There are a lot of welfare issues over the treatment of cows, the amount of CO2 emissions they produce, and the amount of space needed to keep them” [M4463abc].

However, for other respondents, awareness of the environmental impacts of milk was not a sufficient reason to reduce or stop milk consumption, e.g.:

“Though I am admittedly concerned about the contributions of methane from cattle farms to global warming, this hasn’t been a big enough incentive for me to move away from my favourite type of milk [i.e. cow’s milk]” [L6792abc].

Some respondents also expressed environmental concerns about mylks, e.g. in relation to deforestation, monocultures and GMO in soya production, the high water footprint associated with almond milk production, and the greater transport miles for most types of mylks compared to milk, putting them off or reducing their consumption of mylk [e.g. M6807c]. Some respondents explicitly referred to environmental considerations to weigh up between different mylk options, e.g.:

“We have oat milk in the fridge now – lower carbon footprint than soya milk, do not want to support soya plantations” [M6726abc].

Concerns about waste packaging were frequently mentioned in relation to both milk and mylk consumption, and for some respondents packaging was a factor for which product they bought, e.g.:

“Currently I buy Alpro soya and coconut milk. The containers are recyclable and that is a factor when I buy them, however unfortunately and surprisingly in Brighton they do not recycle these containers” [W6724abc].

4.1.3 Skills related to mylk consumption

MOA respondents did not explicitly discuss skills in relation to mylk consumption, but the data does provide examples that highlight the role of skills and 'know how'. For instance, several respondents mentioned that soya milk often curdles in coffee which made them prefer milk or other mylks instead, for instance:

"I bought soya milk for a while instead of dairy milk. However, it did not taste as nice and worse still it curdles when used in coffee. So I am now happily back to drinking cow's milk again" [M6807c].

"About 4 years ago my daughter became vegan and then my husband followed suit (...) so we have oat milk in the fridge now. (...) One carton is for use in cereals and the other is for use in hot drinks as the [oat] milk does not curdle" [M6726].

Curdling of soya mylk in coffee is mainly due to coffee's high acidity, but the chance of curdling can be reduced by using barista style soya milks which contain acidity regulators and by heating soya mylk before pouring, and other types of mylk are less likely to curdle, all of which means that knowledge and skills are relevant for the consumption of mylk.

4.2 Socio-economic and situational factors

As discussed in the literature review, sustainable consumption is shaped by socio-economic characteristics and a range of situational factors, creating patterns of unequal consumption. In this section, we first examine the relationship between mylk consumption and socio-economic factors based on the NDNS data. We then consider a range of situational factors related to milk and mylk consumption that emerged from the MOA accounts. Cost, taste, health conditions and people's relationships emerged as important themes. These factors can be understood as wider structural or physical drivers or barriers to the adoption of mylk that tend to be outside individuals' immediate control.

Socio-economic factors

The consumption of mylk differs considerably across people with different socio-economic characteristics and tends to be higher among better-situated people. For example, around 20.3% of people with an equivalised household income in the top quintile consume mylk, but only 11.6% of people in the bottom income quintile. The MOA data support this finding as several respondents mentioned the high price of mylk as a barrier to consumption, e.g.: "I like soya, almond and oat milk but I imagine it would be quite expensive to buy the amounts I use" [N5744abc]. This is likely to be especially relevant for people on lower incomes.

Around 28.4% of people with at least a first degree consume mylk, compared to only 14.8% of those who did not attend higher education. Mylk consumption also varies by age. It is highest among people in their 30s at 24.4%, and lowest among those aged 70 and over at 7.9%. Mylk consumption is higher among women compared to men with 24.3% versus 16.3% respectively. It is also higher among people with better subjective health (23.6% among those with "very good" health compared to 10.1% among those with "very bad" health). People who say they follow a vegetarian or vegan diet are also far more likely to consume mylk than people who do not, with 49.3% compared to 19.4% respectively. Of course, vegans would not consume any dairy milk, but since "vegetarian" and "vegan" diet are combined in one variable, we cannot examine how much more likely vegans are to

consume mylk compared to vegetarians. Chi-squared tests are significant at the 0.1% level for all of these categories, but there is no significant difference in the consumption of mylk depending on whether children are in the household or not (see Table A2 in the appendix).

[Fig. 2 here, see separate files for titles and notes]

Results from a logistic regression with mylk consumption as the dependent variable (1=consumption, 0=no consumption) confirm that consumption varies strongly by socio-economic characteristics. Controlling for all other factors, people with higher incomes, high education, in their 30s, those with vegetarian or vegan diets, and women are significantly more likely to consume mylk than their counterparts. While there was no significant difference between people with and without children in the bi-variate analysis, having children significantly reduces the likelihood of consuming mylk when all other factors are controlled for (see Fig. 3 and Table A3 in the appendix).

[Fig. 3 here, see separate files for titles and notes]

Relationships

Consumption is often presented as an individual choice, but it is typically influenced by people we live with, by friends and family, and professionals we interact with (Middlemiss, 2018: 178-180). This is particularly evident for food consumption where household level consumption is shaped by the tastes and needs of different household members, and where the practices of one household member might influence practices of other household members. The MOA data provide many examples where household purchasing is shaped by the different needs and tastes of its members. Several respondents mention that they bought more milk when their children were young: “I have never been much of a milk drinker. I bought a lot of milk when my sons were growing up, but now only get through about two pints per week” [B5725abc]. Several respondents also mentioned that they purchase different milk/mylk for visitors: “It’s been handy to have almond milk in as more friends move to a vegan/non-dairy diet” [G4466abc].

Some of the respondents explain how their own milk/mylk consumption is influenced by other people around them. In the following example, a respondent was encouraged by their vegan daughter and a colleague to use more plant-based mylks:

“Being traditionally English I have grown up with dairy milk and despite becoming vegetarian in my teens, remained blissfully unaware of the process by which dairy cows are kept in milk production. It was my daughter that became vegan about 5 years ago and started drinking non-dairy. About the same time a work colleague who is vegan, extolled the virtues and benefits of non-dairy, and I was determined to give it a try” [D4736c].

Several respondents also stated that they would be happy to completely switch to mylk if it was just them in the household, but that the habits and preferences of other household members make this difficult, e.g.:

“If I was just buying for myself I think I would look into alternatives (...), but it would be difficult to persuade the partner to change his tastes or routine (cost, availability and

convenience of local supermarket)” [V3773c].

Health and taste as situational factors

We already discussed health-related meanings in section 4.1 as an element of social practices. There, we referred to ways in which the perceptions that practitioners have of the health impacts of mylk and milk co-constitute practices of milk and mylk consumption. In contrast, in this section we discuss ways in which known health conditions and taste, which manifest themselves in physical experiences such as allergic reactions, sickness, ingestion or disgust, influence mylk or milk consumption (while acknowledging that the distinction between health as a meaning and health and taste as physical conditions is not clear cut).

Some respondents noted that they had reduced their milk intake, or had switched to mylk entirely, due to health issues such as milk protein allergy, lactose intolerance, irritable bowel syndrome, colon cancer or asthma, sometimes following their doctor’s advice, e.g.:

“My main reason for changing to goat’s and soya milk has been health-related. I’ve suffered a lot of gastro-intestinal problems in the past (including Irritable Bowel Syndrome and colon cancer) and was advised by a nutritionist to avoid cow’s milk” [H1745abc].

In addition, individual taste, which can manifest itself in physical experiences of disgust (or pleasure), can also influence the consumption of mylk and milk. Likes or dislikes of the taste, consistency or smell of milk or mylk were mentioned very often as decisive factors for or against consumption:

“I have never liked milk, my dislike stemming from the little half pint bottles of milk we had at school, which had been stood on top of a radiator, so it was nearly warm but not quite. I hated it then, and now” [K798abc].

“As an aside all other milk products, almond/soya etc. are, in my opinion, bloody awful, they are tasteless, diaphanous liquids!” [O4521abc].

Taste often seemed to trump ethical preferences or health considerations: “I feel guilty for buying cow’s milk because it is not kind to cows, but so far it hasn’t stopped me using it I’m afraid. That’s because I haven’t found an alternative that I like” [H6804abc].

4.3 Reconfiguration: systems of mylk provision

Systems of provision – the ways in which the provision of a good or service is organised in the economy (Bayliss & Fine, 2020) – are also very important in shaping milk and mylk consumption as demonstrated by Mylan (2019), suggesting that increasing the consumption of mylk may require ‘reconfiguration’, involving not only changes at the level of the consumer but also at the level of production (Geels et al., 2015). We also discuss the role of advertising which feeds into the creation of some of the meanings associated with mylk consumption as discussed in section 4.1. Here, we examine perceptions by MOA respondents of the ways in which the provision of mylk influences their consumption.

Availability and market structure

Availability of products through market and non-market provision plays an important role for consumption. Several MOA respondents mentioned “free school milk” schemes that they had experienced in childhood and that encouraged milk consumption: “I’m old enough to have had milk provided free at school and I can recall drinking it on its own” [04521abc].

Employers can also play a role in the provision of milk and thus play a role in normalising milk or mylk consumption. As one respondent notes: Milk is provided at work by our employer (since we British are fuelled on tea, and most of us, I imagine, take tea with milk)” (M6844).

Greater availability of mylks in supermarkets and cafes is likely to be an important factor for the observed increase in consumption. Several respondents mention that they had noticed a broader range of milks being available in shops which seems to have encouraged some to try them out of curiosity:

“I know that there are now lots of other “milks” like almond, soya, etc. (...). I have dabbled with other milks occasionally and I do quite like them, but I don’t use enough to justify buying them” [R1025c].

Some respondents saw cafés as sites of experimentation, but also spaces in which milk or mylk consumption was public and frequently questioned. Vegan cafés, for example allowed non-vegan respondents to try mylk: “One of my favourite cafés in a nearby town is a vegan café, so I will have a cappuccino made with oat milk when I go there” (J6917). One respondent wrote that: “I had to specify “cow’s milk” in a cafe the other week and felt like a moderately awful person” (C5847). This suggests that the nature of public milk/mylk use in tea and coffee has changed for some.

Many statements refer to the lack of consumer power when it comes to the ways in which milk is provided. Several respondents express concern that the low price of milk in supermarkets represents a bad deal for farmers. The wish to support the local/UK economy is sometimes mentioned as a reason to stick with milk and dairy products instead of mylk which are predominantly produced outside of the UK: “I think it’s sad that the farmers get paid so little for their milk, it’s no wonder many of them are going out of business, and for that reason alone, I would carry on with dairy milk” [K789abc].

Marketing

Commercial marketing and public sector promotions play an important role in influencing social meanings around milk and mylk, and hence consumer beliefs and attitudes. Several MOA statements reflected on the role that marketing played in forming their own or others’ milk consumption habits, e.g.:

“I have always been a great fan of milk, and could not live without it. When I was young, a popular advertisement encouraged us to drink a pint of milk every day. I have never had any problem following this advice” [A6936abc].

Of course, the provision of free school milk discussed above has not only made milk more available to large cohorts of children, but also carried a positive promotional message.

Some MOA respondents commented negatively on the ways in which mylks are marketed. For instance, one respondent in her mid-40s perceives mylk consumption as a “fad” aimed at a younger generation that she does not regard herself to be part of [P3373abc].

Another respondent remarks on the profitability of the mylk industry, implicitly questioning its marketing messages: “I stick to cow’s milk and have no interest in other trends. (...) I think all these alternative milks are a bandwagon that many have jumped on and highly profitable for the firms involved” [M1327c].

These examples demonstrate that mylk marketing does not equally appeal to all people in society. While the messages or images that mylk marketing invokes can encourage some to consume mylk, they can act as barriers for others.

5. Discussion

This paper set out to contribute to the sustainable consumption literature by examining whether the increased consumption of plant-based ‘mylk’ can be understood as a case of sustainable consumption via product substitution. We first draw on social practice theory with its three elements of ‘material’, ‘meanings’, and ‘skills’ (Shove et al., 2012) to examine whether substituting milk with mylk really is as straightforward as ‘weak sustainability’ approaches might suggest. We then examine other situational factors that shape mylk consumption and that contribute to its uneven consumption in society, before discussing how systems of provision more fundamentally promote or hinder increased mylk consumption. Our study has relevance for other areas of sustainable consumption in which product substitution can play a role as it uncovers processes of “recrafting” social practices, “reconfigurations” of production and consumption, as well as social patterns of these processes, all of which are likely to apply to other product categories too.

Our findings suggest that the increasing consumption of mylk in the UK is an instance of the ‘recrafting’ of practices (Spurling et al., 2013) which involves changes in the three elements of practice (Shove et al., 2012). Over the study period of 2010/11 to 2018/19, the ‘material’ element of milk consumption has undergone transformation as people have consumed less milk and more mylk in the UK. This is good news from an environmental perspective as plant-based mylks have shown to have considerably lower emissions and environmental impacts than dairy milk (Poore & Nemecek, 2018).

However, the NDNS data show that these trends do not represent a simple case of product substitution. While the share of the population that exclusively consumes plant-based mylks has increased by 8 percentage points over the study period, the share of people who consume both milk *and* mylk has increased even more, by 26 percentage points. Rather than completely substituting milk with mylk, more and more people seem to consume mylk alongside milk. Increased mixing of milk and mylk could be in line with a general rise in ‘flexitarian’ diets (Malek & Umberger, 2021). The MOA data offer insights regarding possible reasons for this phenomenon of dietary mixing, as mylk and milk are often used for specific purposes. Additional factors are at play at the household level: to cater for the needs and preferences of different household members or visitors, both mylk and milk need to be purchased by the household.

Many participants also talked about the meanings associated with mylk and milk consumption. Here it was evident that new meanings, especially around environmental and health impacts, are adopted by practitioners when they start using mylks. Milk and mylk consumption each tend to be associated with different health and environment related meanings, supporting findings from previous studies (Haas et al., 2019; McCarthy et al., 2017). While the previous literature already emphasised conflicting health meanings around milk and mylk consumption, our data also showed that while many people consume mylk because they believe it has lower environmental impacts than milk,

some people are concerned about environmental issues around deforestation, water usage and higher transport footprints associated with mylk. The data also shows that using mylk requires ‘know how’ or skills, for instance when it comes to avoiding curdling of soya mylk in coffee. These findings align with previous sustainable consumption studies which argued that the use of new products requires an active recrafting of different elements of practice (Ozaki et al., 2013), including in the transition to low carbon diets (Laakso et al., 2022). Our findings confirm the assumption that the recrafting of practices is likely to differ for different products and consumption domains. For instance, in contrast to the adoption of hybrid vehicles (Ozaki et al., 2013), mylk consumption potentially involves a more complex adjustment of meanings while the recrafting of skills is less related to technical skills and more to the ‘know how’ of how to use mylks for different purposes (for hot drinks vs. cereals or cooking for instance). Further research can shed light on the challenges involved in recrafting practices related to other low carbon product categories.

A second finding in this study is that the rise in mylk consumption is not happening evenly across the population. Mylk still tends to be more expensive than milk, which is likely to be one of the reasons why mylk consumption is closely associated with higher income and higher education. This finding raises questions of justice, which have also been identified in other fields of sustainable consumption, as ‘green lifestyles’ are not equally affordable for everyone. Mylk consumption also varied significantly with age with 30-40 year-olds being most likely to consume mylk. While younger people may generally be more willing than older generations to try milk (or meat) substitutes, the price tag associated with mylks may be an inhibiting factor for people under 30.

The MOA data suggested that other situational factors shape the consumption of mylk. In particular, people’s relationships with intimate others, and their health situation, can act as important drivers or barriers to consuming mylk or milk. For instance, having someone in the household who is allergic to milk or has adopted a vegan diet, can encourage other household members to try and consume plant-based mylks. These findings highlight that sustainable consumption is shaped by social inequalities and relationships, confirming findings from previous research on the important role of relational conflicts around vegan and vegetarian diets (Salmivaara et al., 2022).

Finally, the analysis demonstrates how important changes in the provision of mylks have been for encouraging consumption. Greater visibility and availability of mylks in supermarkets and food outlets like cafés, as well as advertising, have normalised mylk consumption and made it easier for people to experiment with different types of mylk. This supports the argument made in sustainable consumption studies that consumption is not just driven by consumer demand but shaped by production itself (Bayliss & Fine, 2020). These findings also suggest that the rise of mylk consumption can be understood as a process of “reconfiguration” (Geels et al., 2015) and “strong sustainable consumption” (Lorek & Fuchs, 2013) because it does not only involve choice at the level of the individual consumer but a broader reconfiguration of production and societal norms.

6. Conclusion

This paper finds that the increase of mylk consumption in the UK does not represent a straightforward case of product substitution, but a complex process in which people increasingly combine the consumption of milk and mylk. Furthermore, mylk consumption requires the engagement of new meanings and know how, and is shaped by socio-economic and other situational factors, as well as systems of mylk provision.

Questions for future research include: To what extent might the increased mixing of milk and mylk consumption enhance or limit future carbon reductions from households’ milk consumption? How could mylk marketing and policies support a more even adoption of mylk across social groups?

Future research could also compare the role of product substitution across different product categories, examining the extent to which substitution and 'mixing' take place, as well as characteristics of 'recrafting practices' and 'reconfigurations' of production and consumption. Interesting comparisons could be made between mylk and other products that are involved in transitioning towards vegetarian or vegan diets as this study could not include mylk-based products such as yoghurt, cream or cheese, or meat alternatives, which may be associated with different sets of issues when it comes to substituting for their animal-based counterparts.

Retailers, product manufactures and policymakers aiming to stimulate more sustainable consumption via product substitution should broaden their view beyond a focus on information and availability. In addition, they should consider how the meanings and know how that constitute practices will have to change to promote the adoption of new products; how people's relationships and other circumstances can support or hinder adoption; and how adoption can be supported among disadvantaged groups to reduce inequalities in sustainable consumption. For the specific case of mylk consumption, as well as other sustainable products, this could involve devising policies and strategies that reduce the price differential between the standard and the more sustainable product to make such products more affordable to younger people and those on lower incomes.

Conflict of interest

The Authors declare that there is no conflict of interest.

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Sustainable Consumption by Product Substitution? An Exploration of the Appropriation of Plant-Based 'Mylk' in Everyday Life

Appendix

Table A1: Types of mylk consumed

	% of sample	% of alternative milk consumers
Rice	4.05	13.08
Soya	16.33	52.77
Oat	4.92	15.88
Almond	18.08	58.43
Coconut	14.15	45.72
Other non-cow's	1.9	6.14
N	2,084	606

Note: Data from the NDNS Survey 2016/7-2018/9, population aged 16 and over. The table only displays data for the last three survey years because they include some types of plant mylk that previous survey years do not include.

Table A2: Bi-variate association of mylk consumption and socio-economic characteristics (row percentages and Chi-squared statistics)

	Consumes	Does not consume	Chi2	p-value
Top income quintile	20.33	79.67	68.8	0.000
Bottom income quintile	11.63	88.37		
Higher education	28.36	71.64	217.5	0.000
No higher education	14.81	85.19		
16-19	15.12	84.88	167.5	0.000
20-29	24.42	75.58		
30-39	25.46	74.54		
40-49	21.38	78.62		
50-59	21.28	78.72		
60-69	12.99	87.01		
70-79	10.66	89.34		
80+	1.6	98.4		
Female	23.05	76.95	73.7	0.000
Male	15.06	84.94		
Very good health	21.91	78.09	24.2	0.000
Very poor health	10.37	89.63		
Child in hh	19.53	80.47	1.2	0.280
No child in hh	18.97	81.03		
Vegetarian or vegan	48.19	51.81	222.9	0.000
Not veg/vegan	18.14	81.86		

Note: Data: National Diet and Nutrition Survey (NDNS) 2010-2018/9 (UK). Sample size: 7,370 individuals over 16.

Table A3: Logistic regression on mylk consumption

	Consumes mylk
Income tertile 2	0.08 (0.10)
Income tertile 3	0.42*** (0.10)
Child/ren in hh	-0.49*** (0.09)
Age = 21-30	0.62*** (0.16)
Age = 31-40	0.76*** (0.15)
Age = 41-50	0.56*** (0.15)
Age = 51-60	0.27* (0.15)
Age = 60+	-0.38** (0.15)
Female	0.67*** (0.08)
Higher education	0.58*** (0.08)
Health status	0.06 (0.05)
Vegetarian or vegan	1.57*** (0.16)
2011/12	0.31* (0.18)
2012/13	0.76*** (0.18)
2013/14	0.43** (0.19)
2014/15	0.51*** (0.19)
2015/16	0.95*** (0.17)
2016/17	1.38*** (0.17)
2017/18	1.47*** (0.17)
2018/19	1.89*** (0.17)
Constant	-3.77*** (0.27)
Pseudo R2	0.1320
Observations	6,128

Note: Data from the NDNS 2010/11-2018/19, N=6,128. The coefficients are expressed in log odds. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

