



## Meat consumption and flexitarianism in the Low Countries

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### ARTICLE INFO

#### Keywords:

Meat consumption  
Flexitarianism  
Protein transition  
Sustainability  
Data

### ABSTRACT

Against the backdrop of meat production and consumption being increasingly contested, this paper presents a narrative descriptive review of (reductions in) meat consumption in the Netherlands and Belgium with a focus on trends during the period 2010–2020. Based on household panel purchasing data and supply balance sheet data as proxies, our analysis shows that meat consumption in the Netherlands is relatively stable, based on supply balance sheet data, despite an estimated annual decrease of around 250 g per capita per year based on household panel purchasing data. Meanwhile, household purchasing panel data for Belgium show a more steady and stronger decline with an annual decrease of slightly >1 kg per capita per year over the past decade, as well as more fluctuations based on supply balance sheet data. The ‘Covid-year’ 2020 displays a distinct pattern in both countries which deserves further exploration. Both countries face growing shares of (self-declared) flexitarians (ranging from around or above 30% in Belgium to 40% or more in the Netherlands depending on the data source and its definition of flexitarians) and consumers who claim to intend reducing their meat consumption in the future. The analysis reveals important differences in research methodologies, sample compositions, and analytical techniques. Such differences raise caveats for direct comparison between countries and impose challenges for the (European) monitoring of the so-called ‘protein transition’. Although some change is occurring, the data suggest that meat reduction calls resonate still more in terms of people’s attitudes, awareness, and intentions than in overt dietary behavioral change. Overall, our findings provide reason to conclude that the established meat-centered food system and its dominant meat-eating culture are still prevailing in the Low Countries.

### 1. Introduction

A plethora of scholarly studies in recent years open with emphasizing the adverse effects of current mass meat production and over-consumption of meat to planetary and human health, welfare of farm animals as well as global food security. [Parlasca and Qaim \(2022\)](#) provide a recent comprehensive review on the challenges imposed by environmental, health, ethical and socio-economic aspects on global meat consumption. Time and again it is repeated that the impact of today’s industrial meat production practices and high meat consumption patterns on these four crucial aspects is seriously undermining the sustainability of contemporary food systems. Particularly in high- and middle-high-income countries meat-intensive diets are prevailing to consumption levels that exceed dietary recommendations by far. It is, therefore, in affluent nations that reducing meat consumption is first and foremost urgent and justified. Although the worldwide appetite for meat is growing and predictions are that this increase will continue in the

foreseeable future (e.g. [Desiere, Hung, Verbeke, and D’Haese, 2018](#)), the question arises whether the accumulating warnings from the scientific community and public health authorities are being heard in developed countries and wealthy nations like the Netherlands and Belgium. Both nations are neighboring countries situated in Western/Northwestern Europe with a gross domestic product per capita adjusted for purchasing power parity (GDP per capita, PPP) exceeding 50,000 USD in 2020 ([The World Bank, 2022](#)), and colloquially referred to as the Low Countries.

Recently, [de Boer and Aiking \(2022, p. 1\)](#) observed that in “North-western Europe, a majority of consumers saw a role for themselves in making the food system more sustainable and a large minority saw meat reduction as part of a healthy and sustainable diet.” Against this backdrop it is informative to examine in more detail what developments are taking place in (past reductions in – as well future intentions to reduce) meat consumption in the Low Countries. Therefore, this paper presents a narrative descriptive review of meat consumption in the Netherlands and Belgium with a focus on trends in the last decade. The methodology

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<https://doi.org/10.1016/j.meatsci.2022.108894>

Received 28 March 2022; Received in revised form 4 June 2022; Accepted 13 June 2022

Available online 16 June 2022

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consisted of desk research using mainly secondary data from statistical reports, literature review and insights from grey literature, complemented by primary data from own meat consumer studies. Primarily we used food supply balance sheet data and household panel food purchasing data as proxies of meat consumption. National food consumption survey data were used as a secondary data source in the present study and are only referred to occasionally. Each of these three data sources have their pros and cons.<sup>1</sup>

Besides providing an overview of the trends in meat consumption, consumers' intentions to change meat consumption (Section 2) and flexitarianism (Section 3), this contribution also envisages to compare between both countries, unveil similarities and differences, and point at the challenges and obstacles that were encountered while doing so (Section 4). In addition, this paper may be seen from the perspective of a pressing need for studies devoted to bringing together meat consumption data from various countries in order to improve possibilities for conducting cross-cultural studies, for monitoring of the protein transition (i.e. shifting diets away from high in animal proteins towards higher in plant proteins), and for assessing views on meat ranging from meat as 'sacrosanct' and necessary to meat as contested and 'under threat'.

## 2. Meat consumption trends in the Low Countries

### 2.1. Meat consumption in the Netherlands

Despite striking recent developments regarding the rise of plant-based meat alternatives (PBMA) sales in supermarkets (this market's value has doubled in the Netherlands since 2017 from around 100 million euros to approximately 200 million euros today; Dagevos, Verhoog, van Horne, and Hoste, 2021, p. 11–12) and meat reduction (also referred to as flexitarianism; Dagevos, 2021; Verain, Dagevos, and Jaspers, 2022) gaining momentum in the Dutch society and media coverage, looking back to the past years shows remarkably that effective meat consumption has hardly decreased in the Netherlands (Fig. 1). In fact, total meat consumption in the Netherlands has basically plateaued since the early 21st century at a high level of around 77–78 kg per capita based on carcass weight (i.e. food supply balance sheet data) and around 32–33 kg per capita based on household panel purchasing data. Taking

<sup>1</sup> Data used as proxies of meat consumption are threefold: food supply balance sheet data, household panel food purchasing data, and national food consumption survey data. First, the most 'top-down' data source is supply balance sheet data. These are carcass-weight data (including e.g. bones, skin and offal in the case of meat) based on aggregated production minus export plus import data and divided by the size of the population to obtain a per capita figure. These data refer to supply and include all possible utilizations of the concerned food product of which human consumption may account for just one part. Second, household panel food purchasing data are collected from a sample of households who keep records of their food purchases and report this data to e.g. a market research agency such as GfK (Gesellschaft für Konsumforschung) in Belgium and the Netherlands. These data provide insight into what foods households purchase for at-home consumption. However, these data do not account for food consumption out-of-home and do not contain information on who ate what and how much within the household or how much of the purchased food eventually got wasted. Third, national food consumption survey data are cross-sectional data collected from representative consumer samples ('bottom-up') by means of standardized data collection protocols, such as repeated 24-h dietary recalls in the case of both Belgium and the Netherlands. Whereas these data may provide a most accurate picture of meat consumption, they are collected with irregular and often large time intervals of several years, which is hampering their use to assess short-term evolutions in food consumption. In addition, the population base used for the collection or calculation of these proxies of meat consumption is different across each of the three data sources, which hampers direct comparison. Moreover, even the population base between national food consumption surveys differs as in Belgium the participants were aged between 3 and 64 years and in the Netherlands the participants were aged 1 to 79 years.

as a rule of thumb that half of the carcass weight (animal bones included) is available for human consumption, currently around 39 kg of meat per person/per year is consumed in the Netherlands, which is around 13 kg more than recommended by the national dietary guidelines as stipulated in the Dutch Wheel of Five. Although collected from a very different source than the previously mentioned food supply balance sheet data, the average per capita meat consumption level in the most recent Dutch National Food Consumption Survey (2012–2016) ( $n = 4313$ ; 1–79 years of age) amounted 98 g per day adding up to an annual total meat consumption of almost 36 kg. However, the meat consumption of adults (19–79 years of age) was 104 g per day adding up to an annual meat consumption that is even closer to the figure obtained by the food supply balance sheet data. Besides that both figures are remarkably close to each other, from the perspective of the EAT-Lancet Commission both findings on the meat consumption in the Netherlands reveal that a level that fluctuates between 36 and 39 kg is more than two times higher than the EAT-Lancet dietary recommendations (Dagevos, Verhoog, van Horne, and Hoste, 2020, p. 9; Willett et al., 2019, p. 7 and 12).

In retrospect, the Dutch data on the total consumption of meat and meat products of the last decade show that the differences between consecutive years are small and must be rather interpreted in amounts of ounces and pounds rather than kilograms.<sup>2</sup> The largest decrease across years has been booked in the 'Covid-year' 2020 when the per capita meat consumption level dropped with almost two kilograms (in carcass weight) compared to 2019. This decrease in one year time is almost as large as the downward trend during the six years period of 2010–2016. However, until further notice it seems that this decline in 2020 has more to do with the fact that the food service sector had to close completely or partly during the 2020 pandemic year, than with changing consumer preferences, diminishing meat attachment or effective meat reduction tendencies (Dagevos et al., 2021). Fig. 1 also shows that meat consumption at home, based on the household panel purchasing data of GfK, has risen in the 'Covid-year' 2020 – but not so much to undo the drop in the supply balance sheet data of 2020, and not so much as the Belgian findings 2020 point out (see Subsection 2.2).

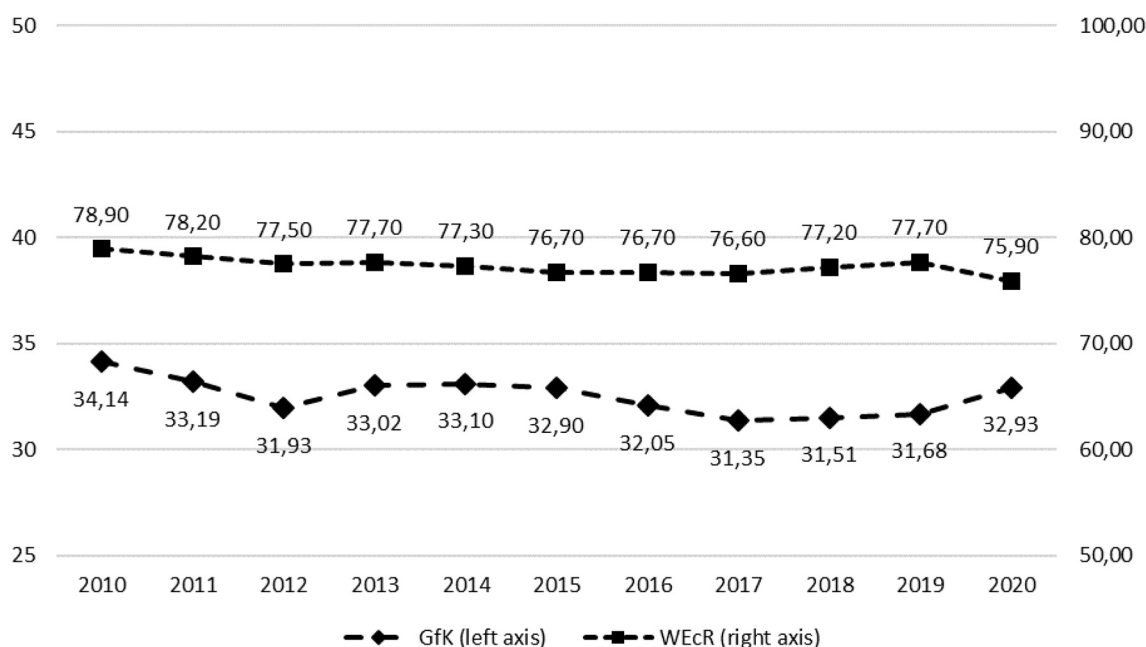
Other trends in the meat consumption of Dutch consumers are a slow but ongoing downward trend in the consumption of pork from 2008 till the latest figures of 2020, and stable figures for beef consumption between 2014 and 2019 as well as for poultry meat consumption between 2011 and 2020. Pork remains the largest meat category consumed in the Netherlands: almost half of the meat consumed consists of pork, followed by chicken (less than a third) and beef (around a fifth). Sheep, goat and horse meat are hardly consumed in the Netherlands and their low numbers show little to no change over the years.

Overall, empirical evidence demonstrated that in general Dutch consumers maintain the status quo of meat-rich diets. On a national level a persisting strong appetite for meat gives a better characterization of the current situation than meat intake being in decline. In other words, the idea of meat 'under threat' is anything but convincingly corroborated in the Netherlands.

However, when acknowledging diversity among consumers and considering different consumer segments, at least a portion of present-day food consumers declared to have reduced their meat consumption and/or reported to have the intention to reduce meat consumption. For the Netherlands, data are available that allow for comparison between the years 2011 and 2019 (see Dagevos, 2014; Dagevos and Voordouw, 2013; de Bakker and Dagevos, 2012; Verain et al., 2022; Verain, Dagevos, and Antonides, 2015) (Table 1). The numbers show an increase in the percentage of consumers stating that their meat consumption in the

<sup>2</sup> Linear regression time series analysis using the raw annual household panel purchasing data and a three-year moving average as dependent variables revealed a significantly decreasing trend in the Netherlands at a pace of 0.242 ( $p = 0.005$ ) and 0.253 ( $p < 0.001$ ) kilogram per capita per year, respectively.

### Total meat consumption per capita (kg) in the Netherlands 2010-2020 (GfK and WEcR)



**Fig. 1.** Evolution of total meat consumption based on household panel purchasing data and food supply balance sheet data in kilograms (kg) per capita per year in the Netherlands, 2010–2020. Notes: GfK data (left axis) are household panel purchasing data; Supply balance sheet data (right axis) are edited by Wageningen Economic Research (WEcR) (Dagevos et al., 2021, p. 6).

**Table 1**

Reported meat consumption change from the past and in the future in the Netherlands in 2011 (n = 1253) and in 2019 (n = 1979) and in Belgium in 2013 (n = 404) and in 2018 (n = 469), % of total sample.

		My meat consumption compared to the past ... has ...							
		Decreased		Not changed		Increased		Total	
I have the intention to ... meat consumption in the next ... year(s)/future	<b>Netherlands</b>	<b>2011<sup>1</sup></b>	<b>2019<sup>2</sup></b>	<b>2011</b>	<b>2019</b>	<b>2011</b>	<b>2019</b>	<b>2011</b>	<b>2019</b>
	Decrease	21.4	27.2	5.3	7.9	0.4	0.6	27.1	35.7
	Not change	7.3	11.6	58.3	44.2	2.1	1.8	67.8	57.7
	Increase	1.0	0.6	2.2	1.9	2.0	4.2	5.2	6.7
	Total	29.7	39.4	65.8	54.0	4.5	6.6	100.0	100.0
	<b>Belgium</b>	<b>2013<sup>3</sup></b>	<b>2018<sup>4</sup></b>	<b>2013</b>	<b>2018</b>	<b>2013</b>	<b>2018</b>	<b>2013</b>	<b>2018</b>
	Decrease	5.7	39.2	2.2	9.8	0.7	3.2	8.7	52.2
	Not change	24.5	7.9	59.2	31.6	5.0	1.5	88.6	40.9
	Increase	0.2	1.1	1.7	1.9	0.7	3.8	2.7	6.8
	Total	30.4	48.2	63.1	43.3	6.4	8.5	100.0	100.0

Notes: 1: The reported 2011-data for the Netherlands refer to meat consumption in general; change from the past refers to ‘as compared to 1 year ago’; intended future change refers to ‘1 year ahead’; 2: The reported 2019-data for the Netherlands refer to meat consumption in general; change from the past refers to ‘as compared to 1 year ago’; intended future change refers to ‘1 year ahead’; 3: The reported 2013-data for Belgium refer to beef consumption; change from the past refers to ‘as compared to 3 years ago’; intended future change refers to ‘1 year ahead’; 4: The reported 2018-data for Belgium refer to red meat consumption (i.e. beef, veal or pork); change from the past refers to ‘as compared to 5 years ago’; intended future change refers to ‘in the future’ without specifying a concrete timeframe.

past year has decreased and indicating at the same time to intend further reducing their meat intake in the coming year: from 21.4% in 2011 (n = 1253) to over a quarter (27.2%) of the Dutch respondents (n = 1979) in 2019. Simultaneously, more than half (58.3%) of the participants in the 2011-survey declared that their meat consumption has remained the same as well as reported to have no intention whatsoever to shift towards a more meat-reduced diet. This small majority turned into a large minority of 44.2% in 2019 (see Table 1, and also Verain et al., 2022, p. 3–4). This outcome among Dutch consumers points to an increase in self-reported intentions to reduce meat consumption. However, when this outcome is related to actual figures of meat consumption per capita, it emerges that such intentions of survey participants are not reflected in

the numbers at the national level. Notably, meat consumption figures of 2012 were a little higher than in 2011; and although meat consumption figures in 2020 were lower than in 2019, this seems to be better explained for now by consequences of the Covid pandemic than by a sudden change in consumer intentions or behaviors.

When the 2019 percentages found are compared to findings of another recent study (Smart Protein Project, 2021, p. 63), they appear to be very close to the results obtained: 58% of the 674 Dutch omnivores and flexitarians included in that study did not intend to reduce their meat consumption – which is similar to the 57.7% of 2019 – while at the same time 36% intended to consume (a little) less meat – which almost equals the result of 35.7% in 2019. This percentage also accords with a

recent result reported by the Netherlands Nutrition Centre (Bos and Keuchenius, 2021) which stipulated that 38% of the Dutch participants stated to eat consciously less meat in the past few years. Taken together, these figures indicate that over a third of the Dutch population is keen on reducing their meat consumption in the coming years. That is, in principle. In practice, however, current trends in meat consumption numbers do not keep pace yet with reported intentions.

## 2.2. Meat consumption in Belgium

Fairly similar developments regarding the rise of PBMA and meat reduction have been observed in the Belgian market, as exemplified by the fact that the share of households purchasing PBMA increased from 23.0% in 2016 to 28.6% in 2020 (De Boeck and Nauwelaerts, 2020). Findings of the most recent (2014) Belgian National Food Consumption Survey (BNFCS) ( $n = 3200$ ; 3–64 years of age) revealed that average total meat consumption among Belgian consumers amounted 111 g per day. More specifically with respect to adults (aged 18–64) the daily average meat consumption amounted 115 g, which is the equivalent of around 42 kg per capita on annual basis. The BNFCS 2014 survey also revealed that 91% of Belgian consumers exceeded the maximum recommendations for meat consumption frequency being a maximum of 4 days per week (based on the recommendation for eating fish or seafood at least twice a week and PBMA at least once a week) (De Ridder et al., 2016). Unlike the trends observed in the Netherlands, meat consumption figures have effectively decreased in Belgium during the past decade (Fig. 2).

Based on household panel purchasing data (GfK Belgium/VLAM, 2022), fresh and frozen meat consumption decreased steadily from 34.1 kg in 2010 to 26.2 kg per capita per year in 2019, which corresponds with an average annual decrease of 0.8 kg per capita per year or almost one quarter over a decade. Shares of different meat types have been fairly stable with poultry meat accounting for about one third (e.g. 33.0% in 2014 and 35.8% in 2019), followed by meat mixtures with 23.1% in 2014 and 22.3% in 2019, pork with 19.3% in 2014 and 19.5% in 2019, and beef/veal with 18.9% in 2014 and 18.2% in 2019. When accounting also for processed meat, household purchasing of total meat in Belgium decreased from 45.6 kg in 2010 to 36.3 kg per capita in 2019 (Fig. 2). Over a decade (2010–2019) this evolution corresponds with a decrease of total meat consumption as measured at household level with almost 10 kg per capita; i.e. a reduction of more than one fifth or around 1 kg per capita per year on average.<sup>3</sup> Notwithstanding these reductions, Van Mierlo, De Ridder, and Geeraerd (2021) assessed – based on data from the latest Belgian National Food Consumption Survey (2014) – that the share of Belgian consumers complying with recommendations for red meat and processed meat consumption (being <300 g red meat per week and < 30 g processed meat per week, Superior Health Council, 2019) amounted only 30.8% and 13.4%, respectively.

The Covid-year 2020 stands out with a peak of 29.5 kg of fresh or frozen meat consumption per capita, or 40.4 kg per capita when also including processed meat. The 2020 meat consumption level is herewith 3.3 kg fresh or frozen meat per capita, and an additional 0.8 kg processed meat per capita higher in 2020 than in 2019 and the total numbers for 2020 are herewith equivalent to the level observed around 2015. The 2020-data herewith raise the question whether the Covid-pandemic has meant a structural break and the start of a revival of meat consumption in Belgium? The answer is most probably a 'no' since at least part of the explanation for the observed 2020 meat consumption level is to be found in the nature of the GfK data and its collection which

is referring to at-home consumption. Owing to lockdowns including closure of restaurants and workplace canteens during several months in Spring and Fall of 2020, at-home meat consumption has logically been higher than in previous years.

A second relevant source of meat consumption data is Statistics Belgium (STATBEL) which provides carcass weight data based on supply balance sheets in a similar vein as in the Netherlands. Meat consumption based on supply balance sheets (excluding edible offal and organ meat) amounted 76.0 kg in 2010 and 69.0 kg in 2019, which means a decrease of 9.2% over a decade despite some ups and downs across years. A similar peak is observed in 2020 as seen in the household panel purchasing data.

Also in Belgium, several sources of cross-sectional data reveal insights into consumers' reported meat consumption changes and future intentions. A first data source of this kind are the bi-annual consumer surveys (2016, 2018, 2020) conducted and/or commissioned by the vegetarian association EVA. Both their 2018 and (pre-Covid) 2020 survey concluded that 44% of the Belgian consumers reported to eat less meat as compared to one year ago whereas half of their 2016 study participants intended to reduce their meat consumption (VILT, 2018, 2020). Own cross-sectional consumer surveys completed in 2013 ( $n = 404$ ; Verbeke, 2015; Verbeke, Hung, Baum, and De Steur, 2021) and 2018 ( $n = 467$ ; Coene, Verbeke, and Minnens, 2018) provide similar insight. Almost one third of consumers indicated to have decreased their beef, pork and processed meat consumption in 2013 as compared to 3 years ago. When aggregating across all meat types, almost half (48%) reported to have reduced their consumption of at least one type of meat. About one fifth (18.8%) indicated to plan to reduce their consumption of meat in the next year. In 2018, around half of the consumers indicated to have reduced their consumption of red meat (52.7%) and processed meat products (46.3%) as compared to 5 years ago. Also one quarter reported to have reduced their poultry meat consumption. With respect to future intentions, more than half of the consumers indicated to plan further reducing their red and processed meat consumption, whereas also one third indicated to plan reducing poultry meat consumption. Both in retrospect and towards the future, >60% of the participants in the 2018-study reported a reduction of the consumption of at least one type of meat. The majority of consumers who indicated in 2013 to have reduced their meat consumption as compared to 3 years ago did not plan a further reduction of their meat consumption. The opposite is observed in the 2018-study sample where the large majority of consumers who indicated to have reduced their meat consumption as compared to 5 years ago indicated to also plan to further reduce their meat consumption in the future (Table 1).

As observed in the Netherlands, the percentage of consumers reporting to have decreased their meat consumption from the past has increased from 30.4% in 2013 to 48.2% in 2018. A striking difference is seen in the Belgian data concerning the percentage of consumers who decreased from the past and intend to further decrease their meat consumption. Whereas this share was only 5.7% in 2013, it increased to 39.2% in 2018, though the longer timeframe in the 2018-study may partly explain this difference. Furthermore, whereas only 8.7% in 2013 reported to intend decreasing their meat consumption in the next year, this number increased to more than half (52.2%) in 2018 (Table 1). Based on the share of consumers (roughly about 50%) who reported intentions to decrease their meat consumption in the most recent studies, one might have expected an acceleration of the decrease of actual meat consumption in the most recent years and in the near future. This has not become a reality yet, or at least it has not become visible in the figures yet partly owing to the disturbance of markets and eating habits as a result of the Covid pandemic.

<sup>3</sup> Linear regression time series analysis using the raw annual household panel purchasing data and a three-year moving average as dependent variables revealed a significantly decreasing trend in Belgium at a pace of 1.114 ( $p < 0.001$ ) and 1.025 ( $p < 0.001$ ) kilogram per capita per year, respectively. This pace in Belgium is four-to-fivefold the pace observed in the Netherlands.

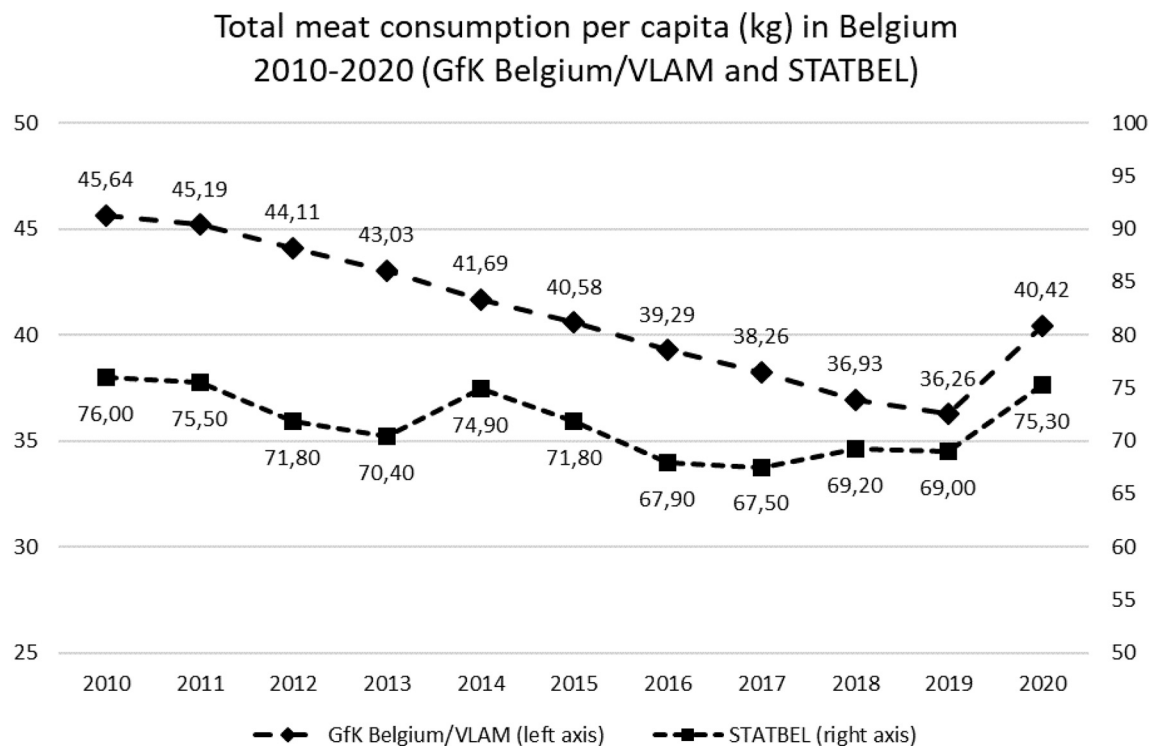


Fig. 2. Evolution of total meat consumption based on household panel purchasing data and food supply balance sheet data in kilograms (kg) per capita per year in Belgium, 2010–2020. Notes: GfK Belgium/VLAM (left axis) data are household panel purchasing data; STATBEL (right axis) data are supply balance sheet data (excluding organ meat and offal).

### 3. Flexitarianism in the Low Countries

#### 3.1. Flexitarianism in the Netherlands

Scholarly interest in meat reduction or flexitarianism has grown in the past decade and has turned into a vibrant field of research (for overviews, see Dagevos, 2021; Moreira, da Veiga, da Veiga, Reisa, and Pascuci, 2022). Also public attention has risen for food consumers who (have the intention to) limit their meat consumption by abstaining from eating meat and meat products occasionally without eliminating meat completely from their diet. Thus, flexitarians are a different dietary group – ‘dietary lifestyle’ – than vegetarians and vegans (veg\*ns) on the one hand. On the other hand, flexitarians differ from avid meat lovers in restricting their meat intake to a certain extent and do not take the persistence of excessive consumption of meat for granted. At present, flexitarianism is often considered as a food style that could be widely accepted and adopted by consumers in order to alleviate adverse environmental, human health and animal suffering effects of current meat production practices and meat consumption patterns (Dagevos, 2021; Himics et al., 2022; Willett et al., 2019).

It is hardly surprising then that in recent years several studies in the Netherlands have been conducted to assess the number of flexitarians. The Netherlands Nutrition Centre recently revealed that 27% of more than thousand survey participants self-identified as flexitarian – next to 4% veg\*ns and 69% meat eaters (Bos and Keuchenius, 2021, p. 26). The VegaMonitor by the environmental organization Nature & Environment (Natuur and Milieu, 2021, p. 4) in turn presented the following 2020-figures: 39% flexitarians, 55% meat eaters, 4% veg\*ns and 2% pescatarians. In a study by Boereboom et al. (2022, p. 3) 41.1% of the Dutch respondents ( $n = 231$ ) recognized their diet in a ‘flexitarian’ avoidance of meat and animal products on some days of the week. The Smart Protein Project (2021, p. 32) came up with a share of 42% in the category of flexitarianism defined as eating meat occasionally, trying to reduce meat consumption and eating plant-based foods regularly –

beside 48% of self-declared omnivores, 4% pescatarians and 7% veg\*ns. A study commissioned by ProVeg Nederland (2022, p. 34) reported that the percentage of flexitarians has risen to 46% in 2020, and that a minority of 47.2% identified as meat eater.

Although flexitarianism could be defined in ‘flexible’ ways and lacks an agreed definition, percentages found around or above 40% coincide with results obtained by Verain et al. (2022). Their online survey studies showed a remarkable increase in self-declared flexitarians. Whereas in 2011 only 13.0% of Dutch meat consumers identified themselves as a flexitarian or meat reducer this percentage drastically rose to approximately 43% in 2019. Such figures may demonstrate that flexitarianism as a food style is mainstreaming and that many Dutch believe this best describes their present food and meat consumption habits.

At the same time it turned out that study participants have not modified their meat eating practices. In comparison to 2011 the frequency of meat consumption expressed as the average number of days of eating meat at dinner increased even slightly but significantly from 4.6 days a week to 4.8 days a week in 2019 (Verain et al., 2022). A similar average of ‘meaty’ days per week was found in The VegaMonitor 2020 (Natuur and Milieu, 2021). Another indication that contemporary Dutch food consumers continue to eat meat in abundance is the finding that two thirds of participants in the study by Bos and Keuchenius (2021) reported to eat meat for 4–7 days a week, and one third to have meat at dinner for 0–3 days per week. Another majority of over 70% eating meat at dinner for 3 to 6 times a week has been found by Verain et al. (2022). When the restriction of meat at dinner time is lifted and Dutch participants were asked about the intake of meat (products) during the day, The Dutch National Food Consumption Survey 2012–2016 reported that on average even at 6 days a week meat or meat products were consumed (Van Rossum et al., 2020, p. 63). In other words, to date eating patterns in ‘a flexitarian era’ signal no substantial – let alone, durable – change in meat consumption frequencies.

Although the latter results help to explain why the consumption of meat remains high in the Netherlands (Section 2.1), it would be both

premature and short-sighted to conclude that Dutch consumers are only highly motivated to continue eating meat in large quantities, are only interested in maintaining well-established meat consumption habits or are unwilling to cut back on meat. Currently, consumer attitudes and awareness on planetary, personal health and animal welfare benefits of changing dietary practices into less meat-rich directions seem to be changing slowly. The centrality of meat on our dish, the normative practice of eating meat in the omnivorous diet, and the hegemonic status of meat culture are becoming subject of public discussion and personal doubt. This is, for instance, reflected in a considerable number of Dutch food consumers belonging to the consumer segments of so-called heavy or conscious flexitarians (Verain et al., 2022). Furthermore, recent studies reveal that many consumers (strongly) disagree with statements about the need to eat meat every day or about meatless meals being incomplete or distasteful (Bos and Keuchenius, 2021; Natuur and Milieu, 2021; Verain et al., 2022), or agree with the idea that we should eat less animal-based products and more plant-based products, and feel an inconvenience with livestock practices of today (ProVeg, 2022). Such signs may be interpreted in terms of a food cultural change wherein the dominant ideology of meat eating ('the culture of carnism') is crumbling somewhat and meat curtailment is entering the normative frame of eating meat as normal, natural, necessary and nice. Accessible ways of meat moderation, such as 'less but better' or smaller meat portion sizes, contribute to a further spread of flexitarianism and the normalization of reduced meat-eating practices. Simultaneously, many Dutch are attached to the taste, convenience and cultural identity of meat leaving little room for genuine meat disgust (Becker and Lawrence, 2021) and meat avoidance (Hagmann, Siegrist, and Hartmann, 2019). The latter is reflected in vegetarianism and veganism remaining quite low (between 4% and 7% according to studies referred to earlier in this subsection). Nevertheless, a certain 'demeatification of the diet' is underway that is expressed by today's popularity of (self-reported) flexitarianism as well as the swift proliferation of no to low meat dishes on the menus of restaurants or cafeterias, and the rising sales of PBMA in supermarkets. Even though the market size of meat substitutes is currently small compared to the size of the meat market, its market share is growing with double digits in recent years in the Netherlands (Dagevos et al., 2021), and the Dutch appeared to consume most plant-based meat products (on average 8 to 10 different types of products per person/per year) among the Europeans (ProVeg, 2021; see also Sijtsema, Dagevos, Nassar, van Haaster-de Winter, and Snoek, 2021).

It is probably not very daring to announce that we will soon conclude that 'peak meat' (see e.g. Whitton, Bogueva, Marinova, and Phillips, 2021; Witte et al., 2021) has been reached in the Netherlands. However, this is not the same as claiming with conviction that meat demand will fall sharply in the coming years or appetite for meat is doomed to disappear in the very near future.

### 3.2. Flexitarianism in Belgium

In a similar vein as in the Netherlands, flexitarianism also received a growing deal of attention during the past decade in Belgium. Based on a study of moral attitudes and behaviors, De Backer and Hudders (2015) concluded that flexitarians are as different from full-time meat eaters as they are different from vegetarians. This justifies considering this group of consumers as constituting a distinct market and dietary pattern, most likely accountable for the major share of the observed decreases in meat consumption. The latter decrease has not been attributed to an increasing share of veg\*ns in Belgium, which has been fairly stable around 4% for the last decade (Verbeke et al., 2021; VLAM, 2020). Reasons for reducing meat consumption, disliking meat or liking plant-based meat substitutes are typical motives or perceived barriers relating to health, taste, environment, animal welfare, price or value for money, habits or mere variety seeking (e.g. De Backer and Hudders, 2014; Grasso, Hung, Olthof, Brouwer, and Verbeke, 2021; Mullee et al., 2017).

Based on data collected in 2011, Mullee et al. (2017) distinguished

between omnivores (83.3%), semi-vegetarians (almost vegetarians, part-time vegetarians and pescovegetarians) (11.8%) and vegetarians (including vegans and vegetarians) (1.6%). Only 10.3% of their study sample indicated to abstain from eating any meat or fish on one or more specific days of the week. Based on a bi-annual survey of five different representative cohorts (2011, 2013, 2016, 2018 and 2020 with sample sizes varying from 580 to 1158), Deliëns, Mullie, and Clarys (2022) reported that the share of flexitarians – defined as eating no meat or fish for minimum 3 days per week – doubled from 5.3% in 2011 to 10.0% in 2016, after which it stabilized. The study also identified a group of consumers accounting for 12.1% of the 2020-sample indicating to eat 'veggie for 1 day per week'. The observed modest shifts away from meat-based diets were attributed to campaigns such as 'Thursday Veggie Day', 'Days without Meat', or 'Try Vegan', some of which were very successful in engaging municipalities and schools and attracting media attention and visibility. The levelling-off of the shift away from meat is attributed to the fact that such campaigns mostly triggered the group of consumers typified as 'more receptive and open-minded' whereas others were much harder to be convinced. The trend towards flexitarianism was most strongly observed among younger, higher educated, female and urban consumers. The study by Grasso et al. (2021) focused on consumers aged 65 years and older in several EU countries and identified three consumer segments that were referred to as heavy, medium and light meat consumers with shares of 8.1%, 15.5% and 29.3% respectively reporting to follow a meat limiting diet (i.e. flexitarian, pescovegetarian, ovo- and/or lacto-vegetarian, or vegan diet). The overall share of elderly consumers adhering a flexitarian diet was 14%.

Other studies reported substantially higher shares of flexitarians in Belgium. For example, the 2020 GfK Belgium/iVox (VLAM, 2020) survey reported that 23% of Belgian consumers eat weekly at least one vegetarian meat substitute and that 35% eat weekly at least one main meal without meat, fish or typical vegetarian meat substitutes. The study by Bryant and Sanctorem (2021) reported 1.3% pescatarian, 1.5% vegetarian and 0.4% vegan consumers in Belgium based on a cross-sectional survey conducted in June 2020 ( $n = 1000$ ). The rest of their sample was composed of 62.2% omnivore and 34.6% consumers categorized as flexitarians. Large contrasts between numbers of flexitarians reported in different studies most probably stem from the use of different methods and definitions for classifying individual consumers as flexitarian or not. For example, rather than referring explicitly to flexitarians, De Backer and Hudders (2014) distinguished between light semi-vegetarians (who avoid meat one or two days a week) and semi-vegetarians (who strongly reduced their meat intake).

## 4. Discussion and conclusions

### 4.1. Similarities and differences in the Low Countries

Meat consumption in the Netherlands has hardly changed during the past decade (2010–2019), both based on household panel purchasing data and supply balance sheet data (Fig. 1). By contrast, in Belgium, at-home meat consumption has decreased substantially and steadily with slightly  $>1$  kg per capita per year over the past decade (2010–2019) as based on household panel purchasing data (Fig. 2) – but nevertheless remains above the Dutch consumption level based on household panel purchasing data. Also when considering data from supply balance sheets a downward trend is seen – though more modest and with more fluctuations from year to year. The 'Covid-year' 2020 stands out in both countries with increasing meat consumption based on household panel purchasing data. A similar Covid-related peak in meat consumption in 2020 has been reported by Font-i-Furnols and Guerrero (2022) in Spain. The increase is considerably more outspoken in Belgium where meat consumption figures in 2020 are back at the level of the 2015-data based on household panel purchasing and even back at the level of 2010 based on supply balance sheet data. Although it is hypothesized that part of the explanation is to be found in the fact that lockdowns during the

pandemic have led to major market and consumption habit disruptions, its precise meaning and the question whether this may signal a structural break remain to be further studied. At least, the hypothesis of an eventual revival of meat consumption contrasts with insights from cross-sectional consumer survey which indicate that about half of the Belgian meat consumers plan to (further) reduce their meat consumption in the future (Table 1). Similar cross-sectional consumer studies in the Netherlands suggest that about one third of Dutch consumers plan to (further) reduce their meat consumption (Table 1). Observed decreases of meat consumption are attributed to the dietary choices of flexitarians whose share amounts between 10% and one third in Belgium and between one quarter and half of the consumers in the Netherlands according to different sources, rather than fast-growing percentages of consumers identifying as veg\*ns.

Considering that Netherlands' meat consumption based on purchasing data (as compared to Belgium) has stabilized at a slightly lower level for the past decade, and with slightly more flexitarians and veg\*ns, and a slightly lower number of consumers reporting intentions to (further) reduce their meat consumption in the future, slightly stronger further meat reduction might be expected in Belgium – albeit figures for 2020 suggest the opposite.

Given the socio-cultural, economic, political, environmental and geographical similarities of the Netherlands and Belgium – as well as similarities in overall public health and nutritional status, food-related habits and eating cultures – there is reason to suggest that both Belgium and the Netherlands could move to lower overall meat consumption levels. Particularly, when both countries would take 'the best of both worlds', i.e. the Netherlands evolving to the 2019-figure of Belgian food supply balance sheet data and Belgium evolving to the 2020-figure of Dutch household panel purchasing data, then a 10–15% further meat reduction could be realized in both countries in the coming years. Time will tell whether this speculation will become true. And if it becomes reality, it is certain that also this lower level of meat consumption still falls short of meeting dietary recommendations.

#### 4.2. Briefly on (the comparability of) meat consumption data

The present analysis and attempt to compare meat consumption and reduction across the Low Countries turned out to be quite challenging despite many similarities between both countries, and to raise several caveats. Direct comparisons between countries and between findings of different studies performed within the same country may be void because of omnipresent differences in research methodologies, study protocols, question framing, data collection methods, sample compositions, and analytical techniques. Troublesome aspects are also that no unified and agreed-upon definition of flexitarianism is available or that meat consumption is not always or automatically defined consistently with 'meat' being sometimes considered as the equivalent of red meat which may (or may not) cover all of beef, veal, pork, lamb, goat and horse meat, whereas the place of poultry or chicken meat, other white meat such as turkey, and processed meat products and products such as canned meat is often unclear.

As concerns data, supply balance sheet data and household panel purchasing data are both relevant data sources as proxies for assessing meat consumption. However, their diverging patterns and year-to-year evolutions are often hard to explain, and the data seem prone to outliers as a consequence of external factors, market disturbances or sudden changes in production or consumption habits, as well as measurement methods. As a result, different conclusions may emerge depending on the data source and timeframe considered. Next to 'top-down' data based on food supply balance sheets and household panel purchasing data – the data sources primarily used in this study – national food consumption surveys provide 'bottom-up' data. Such data might be extremely valuable, but their collection is time- and resource-intensive and their availability is therefore scattered (see Endnote 1). The latter holds true for the national food consumption surveys in both the

Netherlands and Belgium as well. For a pioneering study on trends in meat consumption in the UK based on 'bottom-up' national food consumption survey data, we refer to Stewart, Piernas, Cook, and Jebb (2021).

Finally, so-called grey literature provides valuable insight, but such reports may not consistently contain methodological details or full reports are confidential and not accessible, thus eventually providing fragmentary information without detailed context. Our experience with this comparison across two seemingly comparable countries herewith points at major challenges and hurdles that need to be overcome when envisaging the monitoring of the so-called protein transition, the resilience of food systems within e.g. the European Union's Farm-to-Fork Strategy as part of the European Green Deal, or overall achievements with respect to sustainable development at global level.

#### 4.3. Closing words

Meat consumption levels in the Netherlands and Belgium continue to be far above national dietary guidelines – and even much further away from the EAT-Lancet Commission dietary recommendations (Willett et al., 2019). Our analysis of meat consumption and flexitarianism in the Low Countries suggests that this will stay in the years to come. Our findings provide no reason to conclude that a profound replacement of the established meat-centered food system and its dominant meat-eating culture is emerging. The warning sounds from the scientific community and public health authorities about the importance of shifting diets into less meat-rich directions seem to resonate more in terms of citizen attitudes, consumers' awareness, perceptions and intentions as yet than in terms of overall, overt and convincing meat-reducing consumption behavior. With respect to the latter, changes in the affluent Low Countries are modest and mixed respectively. This does by no means imply however that the protein transition is still waiting for its take-off in the Low Countries. The normality of meat (over)consumption being questioned, the gradual mainstreaming and adaptation of meat-reduced diets and dishes – mainly motivated by environmental, health or animal welfare concerns – by a growing group of flexitarian consumers, the popularity of 'veggie' events and meatless days, the diffusion of PBMA in supermarkets and the food service sector, all exemplify that some change is occurring, albeit hitherto rather slowly.

#### Declaration of Competing Interest

The authors declare no conflict of interest.

#### Acknowledgements

The contribution to this paper by Dagevos was part of a larger project on sustainable protein consumption funded by the Dutch Ministry of Agriculture, Nature, and Food Quality.

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