Proceedings of the Nutrition Society

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The Nutrition Society Congress 2025 was held at The Royal Society, London on 21st–22nd January 2025

Conference on Dietary guidelines and advice – current and future

Symposium One: Reflections on the Eatwell Guide and other dietary guidance

Review Article

Cite this article: Rayner M (2025). Is the Eatwell Guide still appropriate for the UK? *Proceedings of the Nutrition Society*, page 1 of 7.
doi: 10.1017/S0029665125101730

Received: 18 March 2025
Revised: 14 July 2025
Accepted: 18 July 2025

Keywords:
Food guide; Food-based dietary guidelines; Environmental sustainability; Optimisation modelling

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Is the Eatwell Guide still appropriate for the UK?

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Abstract

A national food guide for the UK, providing food based dietary guidelines was first issued in 1995. It was last revised and published as the Eatwell Guide in 2016. The Guide is a pie chart indicating the proportions of foods from different food groups that should make up the ideal diet from a health perspective. The number of segments for the pie chart, the names of the food groups that comprise those segments and the list of individual foods that fit into the wider food groups was in essence decided in around 1995 and have remained essentially unchanged since then. The 2016 edition of the guide – the Eatwell Guide – was the first to employ optimisation modelling to calculate the angles of the segments of the pie chart. This was a significant improvement to the scientific basis to the guide. But still the Eatwell Guide leaves much to be desired and it is time for its revision. This review paper outlines the aims of the guide, provides a brief history of the Eatwell Guide, outlines its strengths and weaknesses and suggests some ways by which the Eatwell Guide might be improved.

Introduction

The Eatwell Guide is a graphical representation of the proportions of foods from different food groups that should make up the ideal UK diet from a health perspective. It is an example of a national food guide described by the Food and Agriculture Organisation (FAO) as 'a graphic representation of all or some of the messages of the dietary guidelines [which] typically represent the recommended food groups in the suggested proportions for a good diet'[1].

There is an important distinction to be made, here, between a food guide and broader food-based dietary guidelines (FBDGs). Not all of a government's FBDGs can be included in a food guide. For example the UK Government's recommendation that high consumers of red and processed meat (i.e. more than 90 g per day) reduce their consumption (to no more than the 70 g per day) is not a recommendation of the Eatwell Guide itself but it, or similar, is found in materials published by Public Health England in support of the Guide[2,3].

It is also important to note that although a food guide, like the Eatwell Guide, is based on nutrient intake recommendations, it does not itself make any recommendations about nutrients. In the case of the UK, these recommendations are summarised in 'Government Dietary Recommendations: Government recommendations for energy and nutrients for males and females aged 1–18 years and 19+ years' published by Public Health England in 2016[4].

This review paper reviews the development of the Eatwell Guide and makes recommendations for how it should be developed in the future. Since the Eatwell Guide contains Government recommendations for food consumption there are various official accounts of what it is, what it recommends and how it has been developed[5,6]. There are several points at which those official accounts and this account differ e.g. in what the Guide precisely recommends and should recommend and indeed what it aims to achieve.

The aims of the Eatwell Guide

The Eatwell Guide has several aims. Here are two aims of the Eatwell Guide from the UK entry in a database of national FBDGs and food guides held by the FAO[1]:

'The Eatwell Guide represents UK Government advice on a healthy, balanced diet'

'The Eatwell Guide is the key nutrition policy tool for health professionals and others working to improve dietary health'.

These two aims are valid aims for a food guide but are incompatible. The first aim suggests that the Guide should be a comprehensive and comprehensible representation of the Government's dietary advice to consumers. But note that the Guide does not represent all UK Government recommendations on healthier eating as has just been said and by common agreement is less than fully comprehensible. The second aim does not require comprehensibility to consumers but if it is to be a 'key nutrition policy tool' it does need to present a comprehensive set of recommendations for the UK diet – preferably in the form of SMART (Specific, Measurable, Attainable, Relevant and Time-bound) targets.

Incompatibility between the aims of comprehensibility and comprehensiveness for the Guide has led to anomalies, inconsistencies, etc. in the Eatwell Guide's recommendations, which

should be rectified. For example: the Guide does not accurately represent the amount of red and processed meat that is recommended (although the underlying calculations would allow for that). And this in turn means that the Guide provides incoherent advice about the consumption of the food group it calls 'Beans, pulses, fish, eggs, meat and other proteins' as will be discussed later.

Many people seem to think that Guide's purpose of providing consumers with advice about healthy eating is more important than it purpose as a tool for policy makers But this is not a view that is universal. The Guide could potentially be used for many policy related purposes including setting population targets for food production and not just consumption. It has been used for monitoring the sales of foods at company level, comparing the levels of marketing of foods with the recommended diet etc.

A brief history of the Eatwell Guide

A brief history of the Eatwell Guide helps to explain why it takes the form it does. By the early 1990s it had come to be recognised by the public health community in the UK that there was a need for a national food guide. Many governments around the word were developing food guides. The US Government, for example, published its first Food Pyramid in 1992. The creation of a new cross-government Nutrition Task Force for the UK in 1993, as part of the Government's 'Health of the Nation' initiative provided the impetus for the development of a national food guide for the UK[7]. Paula Hunt from the then Health Education Authority took the lead on the project with support from the Department of Health and the Ministry of Agriculture Fisheries and Food which led to the development of what came to be known as the Balance of Good Health first published in 1995. See Figure 1.

The development of the Balance of Good Health, established, by consensus informed by specially commissioned research:

a) The basic shape of the guide (a pie chart)
b) The number of segments for the pie chart (five)
c) What the angles represent (% by weight of the diet)
d) The food groups that comprise those segments
e) The list of individual foods that fit into each food group.

It was, very early on, decided that the shape of the guide should be circular rather than triangular in shape, a plate rather than a pyramid, that it should in fact be a pie chart. This was based on consumer research which tested different formats for the guide[8]. In this research pie charts performed better than pyramids in tests of consumer understanding of the underlying recommendations.

The number of segments for the Balance of Good Health pie chart and the food groups that are represented by the segments are set out in a paper by Sue Gatenby, Paula Hunt and myself published in 1995[9]. These features of the guide were based on other food guides[10] However Gatenby et al. is not at all clear about that. For example the Balance of Good Health did not split the 'Fruit and vegetable' group into two groups: fruits and vegetables as did some other guides, such as the US Food Pyramid, and why this should be the case isn't obvious. The foods that were included in the five food groups were decided by consensus. For example the idea that potatoes should not be included in the 'Fruit and vegetable' group originates at this time from a government committee set up to consider whether the UK should have its own 5-a-day guideline like the US[11].

The angles for segments of the pie – denoting the proportions of foods from the different food groups that would be ideal for a healthy diet were determined by methods which are quite opaque. Gatenby et al. state that the 'calculation of segment size has been based upon quantitative guidelines for the consumption of foods within each of the five food groups to ensure a national average diet which is consistent with Dietary Reference Values'[9]. But it gives

1995



2007



2016



Figure 1. The three editions of the national food guide published by the UK Government. 1995, 2007, 2016. Source: [Ref[5]].

https://doi.org/10.1017/S0029665125101730 Published online by Cambridge University Press

little more detail than that. Gatenby et al. acknowledge that a number of different methods can be used to calculate segment size but do not specify what these might be. Optimisation modelling – including linear programming – were discussed but not considered feasible at that time.

The basic form and content of the Balance of Good Health has persisted with its revision: first in the form of the eatwell plate published in 2007 and then in the form of the Eatwell Guide published in 2016. The 2007 eatwell plate was essentially the same as the 1995 Balance of Good Health except for some minor cosmetic changes to the format of the guide such as changing the colour of the handles of the knife and fork, the depiction of a wider range of real foods and small changes to the names of the food groups[5]. The number of food groups depicted remained the same as did the foods included within those groups. The angles of the segments were unchanged.

There were more extensive changes to the eatwell plate when it was relaunched as the Eatwell Guide by Public Health England in 2016[12] These changes were prompted by the publication of a report from the Government's Scientific Advisory Committee on Nutrition (SACN) on 'Carbohydrates and Health', in 2015. This report changed the Government's recommendations on the consumption of free sugars and fibre and so the guide needed to be revised to reflect the changes in the Reference Nutrient Intakes for those nutrients[5].

Following the convening of an external reference group and some limited consumer research it was agreed that the basic shape of the guide – a pie chart – and the food groups that comprise the segments of the pie should remain basically the same but that some other changes should be made.

Firstly foods included in the group called 'Foods and drinks high in fat and/or sugar' in the eatwell plate were divided into 'Oil and spreads' and 'Other foods high in fat and sugar' and these other foods were no longer included within the pie chart. Examples of these other foods such as potato crisps, chocolate and biscuits were shown off to one side. This means that the pie chart for the Eatwell Guide, unlike previous versions of the guide, no longer represents the whole diet, but just 97 % of it[13].

But the most important change was the use of optimisation modelling to calculate the angles of the segments of the pie chart. This was done for Public Health England by Peter Scarborough, Asha Kaur and others and reported in a paper published in 2016[13]. Various methods for optimisation modelling were considered. One method of optimisation modelling is called linear programming. Scarborough et al. didn't use linear programming because the objective function for the modelling (see below) was non-linear but in all other respects their method resembled linear programming.

Optimisation modelling for the Eatwell Guide

Optimisation modelling for diets uses a mathematical equation to find the best combination of foods to meet a specified goal. Optimisation models are made up of three main components:

- Decision variables: the items that the model can combine. In the case of the modelling done for the Eatwell Guide these were the mean amounts of foods from 125 food groups consumed by the UK population
- The objective function: the goal of the model. In this case the smallest possible difference between the population mean consumption in 2008–2011 and modelled consumption of the 125 food groups
- The conditions that the model's outcomes must meet: the constraints. In this case the Government's nutrient and food based recommendations, such as population goals for free sugars, salt, saturated fat consumption, etc.

By 2016 optimisation modelling had often been proposed for use in developing food guides[14]. It had been used in France[15,16], Australia[17] and elsewhere to inform national FBDGs but in not such a direct way as was employed in the UK for the development of the Eatwell Guide.

The methods and results of the optimisation modelling for the Eatwell Guide are described in detail in the paper by Scarborough et al. mentioned above[13]. The modelling resulted in changes in the angles of the segments of the guide, as has already been mentioned, and these changes are shown in Table 1. But the optimisation modelling also had results which are not shown in the Eatwell Guide and even might be said to be obscured by the Guide.

For instance the Eatwell Guide suggests that 'Beans, pulses, fish, eggs, meat and other proteins' as a whole should make up 12·4 % of the UK diet compared with 20·3 % in 2008–2011 (Table 2). But within this food group the optimisation modelling suggests that some foods such as red and processed meat should be reduced (by 82 %) and other foods such as beans, pulses and nuts need should be increased (by 38 %) (Table 2). So the message from the Guide should be eat less meat but more beans, pulses and fish – which isn't clear from the Guide itself – only from the optimisation modelling which underpins the Guide.

In addition to the optimisation modelling Linda Cobiac and others used multi-state lifetable modelling to estimate the health impact of the dietary changes recommended by the Eatwell Guide. They showed that changing the average UK diet to that recommended by the Guide, without increasing total energy intake, could increase average life expectancy by 5·4 months (95 % uncertainty interval: 4·7 to 6·2) for men and 4·0 months (3·4 to 4·6) for women; and avert 17·9 million (17·6 to 18·2) DALYs over the lifetime of the current population[18]. In effect this health modelling goes some way towards validating the optimisation modelling.

Optimisation modelling for other food guides

It would be useful to review how optimisation modelling has been used for developing food guides and FBDGs elsewhere as there are differences in approach. But this has not been done in a systematic way. So here just one other example will be given. In France optimisation modelling was carried out by the French Agency for Food, Environmental and Occupational Health and Safety (ANSES) for the purpose of informing new dietary guidelines subsequently published by the French National Nutrition and Health Program (PNNS) in 2019[15].

For this modelling the decision variables were 32 food groups consumed by the French population (men aged 18–64 and women aged 18–54) The objective function was the smallest possible difference between the population mean modelled consumption and baseline consumption (2006–2007) of the 32 food groups The constraints consisted of 35 nutritional constraints, including reference intakes for vitamins and minerals, and macro-nutrients such as saturated fat and total sugars; 27 toxicological constraints, including limits for additives and pesticides and finally consumption had to be between the 5th and 95th percentile of the current level[15].

https://doi.org/10.1017/S0029665125101730 Published online by Cambridge University Press

Table 1. Names of food groups and percentages of the recommended diet for the Balance of Good Health (1995) and the Eatwell Guide (2016)

Balance of Good Health (1995)	% of diet	Eatwell Guide (2016)	% of diet***
Bread, other cereals and potatoes	33	Potatoes, bread, rice, pasta and other starchy carbohydrates	37
Fruit and vegetables	33	Fruit and vegetables	39
Milk and dairy foods	15	Dairy and alternatives	8
Meat, fish and alternatives	12	Beans, pulses, fish, eggs, meat and other proteins	12
Fatty and sugary foods*	8	Oil and spreads	1
		Foods high in fat, salt and sugars**	3

*The original name for this group. **The name for this group in supporting materials for the Guide[2].***These percentages add up to 100 and so do not precisely represent the angles of the segments in the Guide itself because foods high in fat, salt and sugars are not included in the pie chart but are off to one side.
Sources: [References[1,9]].

The results of this optimisation modelling were not shown as pie charts or as percentages of a pie but some of the results are represented in Table 2, to compare with those of the UK modelling. The results of the UK and French modelling seem to be broadly similar with some interesting differences. Some of these differences are due, of course, to differences in methods, others are related to differences in diets between the two countries. But both modelling exercises lead to quantified recommendations to eat more fruit and vegetables, less high protein foods overall, less red and processed meat, more beans, pulses and nuts and less foods high in fat, salt and sugar as a proportion of the diet.

Criticism of the Eatwell Guide and suggestions for its revision

From its origins as the Balance of Good Health the Guide has been subject to constant criticism – sometimes fair, sometime unfair. Some criticism has been levied at the process of its development and update, other criticism has been levied at its form and content.

Some common criticisms are that the Guide is unscientific, unduly influenced by commercial interests, difficult for people to, too idealistic, too expensive, doesn't take account of food processing, and doesn't take account of the environmental impacts of diets.

Some of these criticisms are unfounded and/or based on a misunderstanding of what the Guide needs to do. But some are reasonable and could be relatively easily addressed. The Eatwell Guide could undoubtedly be improved and indeed should be revised on a regular and scheduled basis as others have called for[19].

The science underpinning the Guide

A common criticism levied at the Guide is that the process of its development and revision has been unscientific. An example of this sort of criticism was that levied at the Guide by the dairy industry when it was relaunched as the Eatwell Guide in 2016. The dairy industry noted that the old eatwell plate had recommended that 15 % of the diet should come from dairy foods but the new Eatwell Guide now recommended 8 %. In response Judith Bryans, of Dairy UK said: "In the UK, dietary guidelines disregard an ever-growing body of robust, science-based evidence which stresses the importance of dairy consumption at all ages'[20]. It is difficult to pin down precisely what the Dairy UK are complaining about here. Is it that they think that the optimisation modelling which determined the angles of the pie had not been performed correctly or that they just didn't like the results?

A particularly vocal criticism of the Guide has come from those who advocate low carbohydrate diets[21]. Their argument is that that the segment represented by 'Potatoes, bread, rice, pasta and other starchy carbohydrates' is too large. This is not really a criticism of the Guide itself but of the underlying nutrient recommendations including those for total carbohydrate, fat and protein. If these are not applicable any more then it is these that needs to be changed and then the Guide changed to reflect the new recommendations.

Undoubtedly that the process for revising the Guide could be improved and made more systematic and transparent. One improvement would be to pre-publish a protocol for the revision of the Guide and, in other ways, follow standard procedures. This is done in other countries. For example, by law, Dietary Guidelines for Americans are published by the federal government every 5 years. A new committee is set up with each revision of the guidelines and predetermined methods are set out including food pattern modelling which is related to optimisation modelling[22]. The process of developing Dietary Guidelines for Americans – by which they mean not just all FBDGs as well as their food guide but nutrient recommendations as well – is not perfect by any means but it is fairly transparent and could at least be partially emulated in the UK.

The influence of commercial interests in the development and revision of the Guide

Another common criticism of the process of the Guide's development and revision is that they have been unduly influenced by commercial interests[23]. There is no substantial evidence that this is the case though it is true that the external reference group for the 2016 revision of the guide, which lead to the publication of the Eatwell Guide, had a majority from food industry bodies[5]. The influence of vested interests in food policy in general has been discussed extensively elsewhere and it seems clear that food industry bodies should not be as closely involved in future revisions of the guide as they have been, or at the very least, there should be clearly defined procedures for industry involvement.

The comprehensibiity of the Guide

It is commonly agreed that consumers and health professionals have difficulty in translating the Government's nutrient recommendations into food-based recommendations. A positive feature of the Guide is that it does. Whether it does that well enough is debatable. And if, as suggested above, the Guide should be a key nutrition policy tool for those working to improve dietary health, then some comprehensibility may need to be sacrificed if the Guide is to fulfil that purpose. In particular the Guide needs to be more specific about foods as opposed to broad food groups to enhance its use as policy tool.

There are intrinsic features of the Guide that make it difficult to understand. In particular the Guide lumps together widely diverse foods which, makes interpretation of the Guide difficult. This particular problem could be ameliorated by subdividing the

https://doi.org/10.1017/S0029665125101730 Published online by Cambridge University Press

Table 2. Base line diet and modelled diet for the food groups of the Eatwell Guide (subgroups not shown in the Guide itself in italics) and the base line diet and modelled diet for the French Food Based Dietary Guidelines

	Current UK diet (2008–2011)	Current UK diet (2008–2011)	Eatwell Guide diet	Eatwell Guide diet	Current French diet (2006–2007)	Current French diet (2006–2007)	Recommended French diet*	Recommended French diet*
	% of diet	g/d	% of diet	g/d	% of diet	g/d	% of diet	g/d
Fruit and vegetables	28·8	342	39·3	526	26·2	278	38·9	681
Potatoes, bread, rice, pasta and other starchy carbohydrates	27·2	281	36·7	473	25·9	275	21·5	377
Oil and spreads & Foods high in fat, salt and sugar	9·9	216	3·8	103	13·0	138	6·1	107
Dairy and alternatives	13·8	221	7·9	173	16·3	173	18·1	317
Beans, pulses, fish, eggs, meat and other proteins	20·3	212	12·4	184	18·6	197	15·4	271
Beans, pulses and nuts	*1·6*	*17*	*2·2*	*29*	*1·4*	15	*2·1*	36
Red and processed meat	*6·5*	*68*	*1·2*	*15*	*9·7*	103	*4·6*	80·7
White meat	*3·4*	*35*	*0·4*	*5·0*	*3·6*	38	*5·5*	97
Fish	*2·4*	*25*	*4·7*	*61*	*2·6*	28	*2·5*	44
Other protein	*6·5*	*67*	*3·9*	*74*	*1·2*	13	*0·7*	13
Totals	100	1272	100	1459	100	1061	100	1753

Sources: [References[13,15]].
*Scenario B1 for adult men (men aged 18–64) in source[15].

groups – and particularly the 'Beans, pulses, fish, eggs, meat and other proteins' group – into subgroups.

Whilst the Guide itself (as opposed to the optimisation modelling on which the Guide is based) only gives quantified recommendations for five broad food groups. Quantified food-based recommendations for more subgroups and even specific foods are also needed by consumers and policy makers. The UK already has some: for overall consumption of fruit and vegetables, fish and red and processed meat and for type of fish. But why just these and not, other foods?

However the Government's FBDGs for these three types of food are misaligned with the recommendations of the Guide. For instance the Government recommendation for fruit and vegetable consumption is more than 5 servings a day whilst the Guide's recommendation is an average of 7 servings a day (on the assumption that a serving of fruit and vegetables is 80 g). And the Government's recommendation that high consumers of red and processed meat (i.e. more than 90 g per day) reduce their consumption (to no more than the 70 g per day is misaligned with the optimisation modelling for the Guide which indicates that red and processed meat consumption should be less than 15 g on average.

In the graphic for the Eatwell Guide only healthier foods within each food group are depicted e.g. the breakfast cereal that is illustrated within the 'Potatoes, bread, rice, pasta and other starchy carbohydrates' is a whole grain cereal, though technically all breakfast cereals including those that are high in sugar come within that group.

The lack of specificity for the guide a function of its basic format but it could be more specific. Along with the Eatwell Guide the UK Government has developed a nutrient profile model to score and classify individual food[24] and this model can be used to differentiate between the healthiness of foods within food groups.

There are other features of the Guide which are potentially confusing. Firstly, what the angles represent is somewhat opaque: they represent the proportions of foods from the different food groups by weight rather than say by number of servings or contribution to energy intakes but this is not immediately obvious. There have been some (industry backed but not Government endorsed) attempts to translate the angles into numbers of portions[25].

Secondly, the Guide does apply to composite foods but few composite foods are shown in the guide as these have normally to be broken down into their ingredients and apportioned to more than one group when applying the Guide to a diet.

Thirdly, the angles of the segments have been adjusted to take account of the high water content of beverages but this is not immediately apparent.

Finally since the Guide represents the ideal diet for an average adult in the UK, and since diets are diverse for multiple reasons, its recommendations are not appropriate for some people e.g. those with special dietary requirements or medical needs. It may also not appear to be relevant to those from different ethnic groups whose diets are made up of foods that are very different those depicted in the graphic for the Guide.

Many of these less than comprehensible aspects of the Guide are because the use of a pie chart to represent an ideal diet has intrinsic limitations and it is worth noting that the official French FBDGs do not include a guide[1]. After 30 years it might be time to reconsider whether the advantages of a pie chart outweighs its disadvantages.

The idealism of the Guide

The way the Eatwell Guide is currently constructed means that it represents an ideal diet. This means that its recommendations

https://doi.org/10.1017/S0029665125101730 Published online by Cambridge University Press

might seem extreme and also impractical. For example 15 g of red and processed meat per day constitutes an 80 % reduction from current levels. This 'idealism' has been even been tempered by using an objective function for the optimisation modelling which generated a diet with the least possible differences from current consumption. The idealism is a reflection of the underlying 'idealism' of the nutrient recommendations: particularly those for free sugars, fibre and salt which are the main limiting constraints for the optimisation modelling[13]. For example the optimisation modelling used as a constraint for free sugar intake the recommendation of less than 5 % energy which is well below current consumption of 11 %.

No one is suggesting that the recommendations of the Eatwell Guide could be met tomorrow. There must be time for adjustment. However the Eatwell Guide could be made less idealistic by relaxing the constraints for the optimisation modelling but if so this should be done in a systematic and transparent way. Alternatively the targets set by the guide could be made SMARTer and in particular made Time-bound,

The cost of the diet recommended by the Guide

Most analyses of the cost of healthy diets suggests that healthier eating costs more than less healthy eating[26]. The investigation of the costs of the diet recommended by the Eatwell Guide that was published, along with the optimisation modelling in 2016, found that the 'Eatwell Guide Diet' was no more expensive than the baseline diet (2008–2011)[13]. But basically the finding was anomalous. The estimates have also have also been updated for 2022 and 2023 and found to be higher for the Eatwell Guide diet than the baseline diets[27]. In her review paper, in this edition, of the Proceeding of the Nutrition Society, Asha Kaur discusses the affordability of diets that align with the Eatwell Guide in more detail[28]. It is a matter of some contention whether food guide recommendations should take account of the costs of foods or not. It is not obvious that they should.

Food processing and the Guide

At this time when the concept of ultra-processed foods is much discussed it might be useful to reflect on how the Eatwell Guide takes account of food processing. Basically it doesn't. However it does recommend a reduction in the consumption of foods in the group called 'Foods high in fat, salt and sugar' from approximately 10 % to 3 %[13]. And these 'Foods high in fat, salt and sugar' are presumably almost entirely ultra-processed foods as defined by the Nova food classification system -the most widely used food classification system based on the extent and purpose of foods processing

However estimates of ultra-processed food consumption in the UK generally come in at much higher than 10 % and are closer to 50 %[19,29] and indeed ultra-processed foods can be found in all the other groups represented by the segments of the guide, and sometimes even depicted in the graphic, such as soya drink in the 'Dairy and alternatives' group and baked beans in the 'Beans, pulses, fish, eggs, meat and other proteins' group.

Basically, it is difficult to see how the Guide could take account of ultra-processing as defined by Nova or similar without radical revision of the Guide.

The extent to which the Guide takes account of environmental sustainability

Perhaps the most important criticism of the Eatwell Guide is that it doesn't take account of the environmental sustainability of the diet and this could be relatively simply rectivied. Despite what it says above the pie chart the Eatwell Guide doesn't take account of environmental sustainability because the optimisation modelling only involved health-related constraints.

Public Health England did commission the Carbon Trust to carry out a post-hoc analysis of the difference between the environmental impact of the current diet (the 2008–2011 baseline diet for the optimisation modelling) and the modelled Eatwell Guide diet[30]. The Carbon Trust considered greenhouse gas emissions, water consumption and land requirement and its overall finding was that, 'for an equivalent provision of energy, the Eatwell Guide has a 32 % lower environmental footprint than the current national (NDNS) diet.'

Subsequently, Pauline Scheelbeek and colleagues have also analysed the environmental impacts of footprints of diets that meet Eatwell Guide recommendations[31]. Scheelbeck et al. considered total greenhouse gas emissions and blue water footprints for diets and concluded that 'increased Eatwell Guide adherence is associated with a lower environmental footprint in terms of Greenhouse Gas emissions, although not water use'. However, Scheelbeek et al. had an anomalous way of assessing compliance with the Eatwell Guide. For example, they regarded the government's recommendation for red and processed meat of less than 70 g/d to be what the Eatwell Guide recommends but as discussed above the Eatwell Guide actually recommends 15 g/d. 70 g/d was the constraint used for the optimisation modelling for the Guide but not the final recommendation.

It would have possible, if difficult, at the time to incorporate environmental constraints into the diet optimisation modelling for the Eatwell Guide carried out in 2015/2016. For example, by 2011, Jenny Macdiarmid and colleagues had produced a revised version of the eatwell plate for the Wold Wide Fund for Nature – the LiveWell Plate – which used optimisation modelling (linear programming) with health-related constraints similar to those used to develop the Eatwell Guide plus a constraint for Greenhouse Gas emissions[32,33] Any future revision of the Eatwell Guide should involve optimisation modelling with both health-related and environmental constraints.

Conclusion

In summary:

- A key feature of the Guide is that it represents the food groups that make up the UK diet in the suggested proportions for a healthy diet.
- The Eatwell Guide (and wider FBDGs) should be revised every five years using a pre-published protocol.
- The revision the Guide should use optimisation modelling with both health related and environmental constraints.
- If the basic format for the Guide is to be retained then food groups of the Guide should be reconsidered to give greater differentiation amongst foods.

Acknowledgements. The author thanks Asha Kaur and Peter Scarborough for their contribution to the thinking behind this review paper.

https://doi.org/10.1017/S0029665125101730 Published online by Cambridge University Press

Author contributions. The author had sole responsibility for all aspects of the preparation of this review paper.

Competing of interests. The author is an employee of the University of Oxford. He received grants for his work on the development of the Balance of Good Health (from the Health Education Authority in 1994/1995) and the optimisation modelling for the Eatwell Guide (from Public Health England in 2015/2016)

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