The (Food) Theory of Everything

The susDISH analysis system for scoring menus

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The celebrity physicist Professor Stephen Hawking may be trying to find the number or equation that defines 'time'; you do not have to understand physics to enjoy the insight into his professional and personal challenges beautifully portrayed in the film, 'The Theory of Everything'. Dr Toni Meier of the Martin Luther University in Halle Wittenberg in Germany has the more modest ambitions of developing a menu system that combines the criteria of both nutrition quality and environmental impacts. Can these chalks and cheeses be combined to form a single menu rating that is meaningful? Something that every caterer will be able to use to traffic-light menus into red-no or green-yes decisions?

The computer algorithm Dr Meier has developed is called susDISH (from the term sustainable dish). More than 1000 menus have been rated, and caterers in many public and private institutions in Germany will be doing trial runs. Canteens such as those of the car production sites of BMW, or of the Universities of Berlin already mandate nutrient scoring systems, and adding eco points or greenhouse gas emission scores is just further fine tuning. "Where's the Beef?" is a well-known American catch-phrase, first used by the hamburger chain *Wendy's* to promote its claims of more-meat than rival burgers, but now a phrase used by politicians and others in debate wanting facts and detail over puffery. It may also be the question that German canteen users ask after a susDISH menu analysis.

There are three aspects to the susDISH analysis. Firstly health points, which are based entirely on the nutrient content of the meal. There are 16 macro and micronutrients included in the calculation, with minimum cut-offs calculated to provide one-third of reference intakes (for, example, lunch), with margins of five percent over or under the cut-offs. For a few nutrients there are maximum cut-offs (protein/fat/sodium/cholesterol). Only energy contents, which are based on figures of adult Physical Activity Levels (PALs) of 1.6, have the wider margin of ten percent over or under cut-offs. The more nutrients there are within the cut-offs, the higher the health points, the top score being 16 for the attainment of all the nutrient and energy criteria. Health points for sample menus analysed score highest for menus that include meat, and lowest for the vegan menus, although the span of about two points indicate minor differences over the full range of zero to sixteen (see

Table 1). Typical faults for menus are inadequate levels of calcium or vitamin B_{12}, and excess levels of sodium. Meat-containing menus can maintain high nutrition scores with smaller meat portion sizes, so health point optimisation can be more a process of changing recipes rather than changing ingredients.

The second aspect is the eco-point score. This method of analysis was developed and is widely used in Switzerland (Frischknecht, 2013), and uses measures of ecological scarcity. Criteria are based on national targets, and capture field-to-fork analysis of a wide diversity of ecological aspects of food production and preparation, such as pesticide use, water use, air pollution, soil degradation, nitrate excess, and loss of biodiversity. Eco-points vary very widely per kilo of product; Beef hits 1344 points, but other animal-source foods scatter less predictably (butter 811, cheese 549, milk 131, pork 511, poultry 336, eggs 238 and fish 51-164). Of course the gradient of milk to cheese to butter reflects the concentration of the product from processing, and weight quantities of butter consumed are usually lower than those of milk, so recipe level scores are different (see table 1). All plant-source foods score below 200 eco points per kilo.

The third and final aspect included in the susDISH analysis method, is the calculation of greenhouse gas emissions that can be attributed to food products. Although carbon footprint data is only one component in the assessment of environmental impacts, it has a defined methodology of assessment that allows clear categorisation of products (see table 1).

Dr Meier calculated health and eco points from different menu items, and used traffic light banding to illustrate results in a scattergram (see figure 1). The red zones were dominated by beef dishes on the eco points axis, and by a few pork and vegan dishes on the health points axis. This data could be used to cut red menu items from the catering roster. Or to present data to consumers to allow their 'informed choice' on these issues. Or to schedule red meal items into smaller portion size or less frequent offerings on the menu cycle. Or obvious and pragmatic conclusions could be drawn that computer algorithms can only endlessly fine-tune what are long established conclusions, that beef consumption has the greatest adverse environmental impacts, and vegan diets have certain nutrient deficits that benefit from the use of fortified foods or supplementation.

Some further analysis of menu data shows that where recipe adjustments are made to improve scoring for eco points or greenhouse points, there is usually also an added benefit to the caterer of a reduction of the cost of ingredients. Obviously this relates to reduced portion sizes of what is usually the most expensive ingredient (meat). In contrast, adjustments to improve the health point scores of vegan recipes may result in increased costs, due to the use of specialist or more expensive ingredients.

Table 1: Sample scores for different menus

Menu	n=	Health points>=√	Eco points>= X	Greenhouse points >=X
Mixed menu	155	11.8	104	1.6
Beef dishes	19	12.7	273	4.1
Pork dishes	34	11.5	114	1.7
Poultry dishes	25	12.3	87	1.4
Vegetarian	40	11.7	71	1.1
Vegan	14	10.6	42	0.8

Another assessment of nutrition and environmental impacts has been carried out by the Swiss canteen company SV Group and the World Wide Fund for Nature (WWF) group in Switzerland. Life Cycle Analysis (LCA) of all food purchases made by the catering group was calculated, and they identified a 20% reduction in greenhouse gas emissions that could be made by the introduction of three measures:

1. Reduction of food waste by changes to specifications, and changes in kitchen practice
2. Reduction in the use of vegetables grown in heated greenhouses, and increased use of foods that are seasonal and not transported by air.

3. Reduction in the amounts of meat per meal, and greater availability and frequency of vegetarian meal choices

The catering initiative launched in more than 70 Swiss staff canteens was branded ‘One Two We’ (meaning *one* – you the customer, together with SV catering making *two* partners, and together *we* aim to reduce greenhouse gas emissions). The programme was awarded the 2013 Zürich Climate Prize.

Nutrient analysis of menus is long established, and assessment of sustainability criteria in catering decisions is also very familiar, if still rather variable and inconsistent in the criteria and weightings used. The ability to integrate such data is an appealing concept for those involved in catering (especially for those involved in the marketing of catering services), and dietitians should seize the opportunities offered by the demand for nutrition-plus information.

Information sources:

Frischknecht R, Büsser Knöpfel S (2013) Swiss Eco-Factors 2013 according to the Ecological Scarcity Method. Methodological fundamentals and their application in Switzerland. Environment studies report no 1330. Federal Office for the Environment, Bern: 254 pp.

Jungbluth N, Keller R, Konig A, Doublet G. One Two We – life cycle managements in canteens together with suppliers, customers and guests.9th International Conference LCA of Food. USA, 8-10 October 2014

Information about the susDISH programme is available on: www.nutrition-impacts.org

Information about the One-Two-We catering initiative is available on: http://www.one-two-we.ch/en/onetwowe/