Sustainability in FBDGs: The Dutch approach

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How to incorporate sustainability into FBDG?
4 approaches

(but 1st an introduction)
European advices on sustainable diets

Voedingscentrum
The Task Force ... concluded that environmental aspects should be included in the future conceptual framework for FBDG. A change in terminology to sustainable FDBG (SFBDG) could reflect this.

... further work needs to be done exploring current practice, existing methodologies, and the future prospects for incorporating other relevant dimensions into a future FENS conceptual framework for SFBDG in Europe and working groups were formed to address that.
Approach 1: Giving additional advices and rules

Nordic countries: 5 recommendations (2012)

- To reach a more sustainable diet requires more plant-based foods and less animal-based food.
  1. choosing primarily meat and fish with low environmental impact;
  2. eating more dried beans, peas, lentils, and cereals;
  3. choosing mainly field vegetables, root vegetables, potatoes, fruits, and berries that store well;
  4. choosing perishable products when they are in season;
  5. and minimizing waste.
Finland (2014)

- Healthy choices, such as plant-based and less red meat are preferable for sustainability reasons.
- Reduce food waste.
- Weight control for sustainability reasons: higher energy needs for overweight people.

Sweden (2015): “Find your way to eat greener, not too much and be active.”
<table>
<thead>
<tr>
<th>SDG</th>
<th>Messages</th>
<th>Finland</th>
<th>Sweden</th>
<th>Netherlands</th>
<th>UK</th>
<th>Germany</th>
<th>Belgium</th>
<th>Estonia</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>less animal-based, more plant-based</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
</tr>
<tr>
<td></td>
<td>less meat total</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
</tr>
<tr>
<td></td>
<td>less red/ processed meat</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
</tr>
<tr>
<td></td>
<td>certified fish</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
</tr>
<tr>
<td></td>
<td>less dairy/ substitutes</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
</tr>
<tr>
<td></td>
<td>more pulses</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
</tr>
<tr>
<td></td>
<td>drink tap water</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
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<tr>
<td></td>
<td>less ultra-processed foods</td>
<td></td>
<td></td>
<td></td>
<td>v</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>more vegetables and fruits</td>
<td>v</td>
<td>v</td>
<td>v</td>
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<td>v</td>
<td>v</td>
<td>v</td>
</tr>
<tr>
<td></td>
<td>seasonal vegetables</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
</tr>
<tr>
<td></td>
<td>local products</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
</tr>
<tr>
<td></td>
<td>certified/ organic/ fair</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
</tr>
<tr>
<td></td>
<td>less food waste</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
</tr>
</tbody>
</table>

(See also Gonzalez Fischer & Garnett 2016; Mason & Lang, 2017)

### Netherlands (2016): 7 rules to eat more sustainable

#### Zeven regels om duurzamer te eten
De uitkomsten van deze factsheet kunnen naar de consument vertaald worden in zeven eenvoudige regels.

1. Verspil zo min mogelijk voedsel, door op maat te kopen en te koken.
4. Eet niet meer dan je nodig hebt. Laat vooral producten van buiten de Schijf van Vijf staan, zoals snacks.
5. Drink zo min mogelijk suikerhoudende dranken en alcohol en kies voor kraanwater, thee en/of koffie.
6. Eet voldoende volkoren graanproducten, groente en fruit.
7. Kies milieuvriendelijke groente- en fruitsoorten door te letten op de herkomst en het seizoen.

Veel van de duurzamere keuzes zijn ook gezondere keuzes.
Other examples

UK (2016): Eatwell Guide

USDA report (2015) rejected

Canada (2019)

Sustainable Healthy Diets: new definition WHO/FAO (2019)

- “Sustainable Healthy Diets are dietary patterns that promote all dimensions of individuals’ health and wellbeing; have low environmental pressure and impact; are accessible, affordable, safe and equitable; and are culturally acceptable.
- .... And support the preservation of biodiversity and planetary health.”
Approach 2:
Demonstrate synergies
Double Pyramid (Italy, 2010): The lower the *footprint*, the more preferred

Guidelines for a healthy diet: the ecological perspective (2011)

- "In general terms, a shift from the usual diet towards that described in the Guidelines for a healthy diet is good not only for health, but would also seem to be beneficial in terms of land use and greenhouse gas emissions."

(Health Council, 2011)
### 4 advices (Health Council, 2011)

<table>
<thead>
<tr>
<th>Description</th>
<th>Health</th>
<th>Ecological Sustainability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eat a less animal-based and more plant-based diet: Containing fewer meat and dairy products and more whole grain products, legumes, vegetables, fruit, and plant-derived meat substitutes.</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>The reduction of energy intake for those with an excessive body weight, in particular by eating fewer non-basic foods, such as sugary drinks, sweets, cakes and snacks.</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td>Reducing food waste.</td>
<td>+/-</td>
<td>++</td>
</tr>
<tr>
<td>Eat fish twice a week, including one portion of oily fish. Even though the indications are that a single portion of (oily) fish per week is enough to lower the risk of cardiovascular diseases, this recommendation is ecologically detrimental -&gt; Reformulate</td>
<td>+</td>
<td>-</td>
</tr>
</tbody>
</table>

### Dietary guidelines (2015): prevention chronic diseases

- Higher consumption recommended: vegetables, fruit, wholegrain products
- Maintenance of current consumption recommended: dairy products
- Replacement recommended: replacing processed meat with beans, pulses, and seeds
- Limitation recommended: replacing red meat with plant-based meats, refined sugar, and alcohol
“Follow a dietary pattern that involves eating more plant-based and less animal-based food, as recommended in the guidelines.”

Traditional diets: healthy & sustainable Mediterranean, New Nordic, Low Lands (van Dooren et al. 2015)

- “All of the patterns include a lot of vegetables, fruit, wholegrain products, nuts, legumes, oils rich in cis-unsaturated fatty acids, reduced-fat and low-fat dairy products, poultry and fish;
- none include much red or processed meat, full-fat dairy products, hard fats, salt or drinks (or other products) with added sugar; all involve alcohol moderation.” (Health Council, 2015)
Common ground in healthy sustainable diets:
High nutrient density and low energy density.

- From a health perspective WHO (2003) advise consuming nutrient dense foods within a total diet with low (metabolic) energy density.

- Nutrient density indexes summarize and aggregate densities of individual macro- and micronutrients.

\[
\text{Sustainable Nutrient-Rich Foods index} = \frac{\text{g FP (g) \times g FP (g)}}{\text{g plant protein (g) \times g FP (g)}} - \frac{\text{g sodium (g) \times g FP (g)}}{\text{g digestible fibre (g) \times g added sugar (g)}}
\]
SNRF-index

Nutrition Triangle Belgium (VIGL, 2017)
Approach 3: Optimisation modelling

1. Additional rules
2. Demonstrate synergies
3. Optimisation modelling
4. 

‘The Diet Problem’

For a moderately active man weighing 154 pounds, how much of each of 77 foods should be eaten on a daily basis so that the man’s intake of nine nutrients will be at least equal to the recommended dietary allowances (RDAs) suggested by the National Research Council in 1943, with the cost of the diet being minimal?

1943, George Stigler

1947, George Dantzig

Linear programming: Simplex method
Looking for the optimal ‘green’ solutions

- Constraints on nutrients (healthy)
- Constraints on environmental impact (sustainable)
- As close as possible to the current diet

Range of diets
Acceptability constraints versus reduction goal

‘As close as possible to current diet’

52 studies (2000-2016).
12 studies that applied ecological constraints (3 with Optimeal).
Weaknesses: a small number of food items and/or nutritional constraints.
Introducing acceptability constraints is recommended (but no study has provided the ultimate solution to calculating acceptability).
Increase in diet studies looking at environmental and acceptability constraints

(van Dooren, 2018)

Available linear programming models

- Optimeal in Matlab Compiler 7.16 (Blonk Consultants, NL).
- Microdiet System, 1990 (Fletcher, UK)
- Spreadsheet programmes provide a simple, free solver function for LP
- Excel “Nutrisurvey” free (Briend, 2003)
- SAS (Version 8.02) + Excel SOLVER developed by Frontline Systems (Gao, 2006)
- LINGO Hyper (10.0, LINDO Systems Inc., USA)
- R 2012 through a GNU Linear Programming Kit + IpSolveAPI package (or “Rglpk”)
- MS Nutrition Excel + Apps (Vieux, 2014, France)
  → FAO diet optimisation package for food based dietary guidelines + Diet optimisation on FAO/WHO GIFT platform data (2019)
Livewell plate UK (WWF, 2011)

Goal: 25% reduction in greenhouse gas emissions through linear programming
Translation to the Wheel of Five

Diet optimisation modelling

Preconditions modelling

- In line with dietary guidelines AND dietary reference values from the Health Council
  - Minimal and maximal amounts of food groups and nutrients
  - Provides 100% of the essential nutrients
    - Provides on average 85% of kcal
  - Sustainable and feasible: maximal amounts of food groups
  - Close to the current diet of each target group
- Target groups (age, gender, activity level, preference, ethnicity)
Constraints: on products, not on impacts (GHGE, LU)
Based on environmental impact & feasibility

Table 2. List of food constraints for adults used in the optimisation calculations in the development of food-based dietary guidelines for the Netherlands

<table>
<thead>
<tr>
<th>Food group</th>
<th>Minimum</th>
<th>Reason for minimum</th>
<th>Maximum</th>
<th>Reason for maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetables (g/d)</td>
<td>200</td>
<td>Health*</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Fruit (g/d)</td>
<td>200</td>
<td>Health*</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Wholegrain cereals (g/d)</td>
<td>90</td>
<td>Health*</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Fish (g/week)</td>
<td>100</td>
<td>Health†</td>
<td>125</td>
<td>Environmental impact</td>
</tr>
<tr>
<td>Legumes (g/week)</td>
<td>65</td>
<td>Health†</td>
<td>135</td>
<td>Feasibility§</td>
</tr>
<tr>
<td>Red meat (g/week)</td>
<td>–</td>
<td>Male: 500†, †</td>
<td>–</td>
<td>Environment impact</td>
</tr>
<tr>
<td>Total meat (g/week)</td>
<td>–</td>
<td>Female: 50th percentile of consumption§</td>
<td>–</td>
<td>Environmental impacts</td>
</tr>
<tr>
<td>Eggs (g/week)</td>
<td>–</td>
<td>Health†</td>
<td>150</td>
<td>Environmental impact</td>
</tr>
<tr>
<td>Nuts (g/d)</td>
<td>15</td>
<td>Health*</td>
<td>25</td>
<td>Feasibility§</td>
</tr>
<tr>
<td>Dairy products (g/d)</td>
<td>300</td>
<td>Health†</td>
<td>75th percentile of consumption§</td>
<td>Environmental impact</td>
</tr>
</tbody>
</table>

Results of optimisation:
large variation between gender and age
**Recommended daily amounts (women, 19-50 yrs)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>grams of vegetables</td>
<td>250</td>
</tr>
<tr>
<td>fruit portions</td>
<td>2</td>
</tr>
<tr>
<td>slices of brown or whole grain bread</td>
<td>4-5</td>
</tr>
<tr>
<td>tablespoons of whole grain products or number of small potatoes</td>
<td>4-5</td>
</tr>
<tr>
<td>portions</td>
<td>1</td>
</tr>
<tr>
<td>grams of unsalted nuts</td>
<td>25</td>
</tr>
<tr>
<td>dairy portions</td>
<td>2-3</td>
</tr>
<tr>
<td>grams of cheese</td>
<td>40</td>
</tr>
<tr>
<td>grams of oils and fats</td>
<td>40</td>
</tr>
<tr>
<td>litres of liquids</td>
<td>1.5-2</td>
</tr>
</tbody>
</table>

**Meets DRV’s**

1 In this segment our advice is to vary between products. Choose weekly.

- 100 grams of fish
- 2-3 tablespoons of legumes
- max. 500 grams of meat
- 2-3 eggs

**Educational model FBDG: Wheel of Five**
Less meat and more plants

- Maximum of 500 grams of meat/week.
- Maximum of 300 grams of red meat/week.
- Fish: 1x/ week (was 2x/ week).
- Milk: somewhat lower recommendation (almost equal to the actual consumption).

More plant-based: protein sources

- New: eat weekly a portion of pulses (135 g).
- New: eat daily a handful of nuts (25 g).
- Good vegetarian meat alternatives as option.

Wheel of Five (NL) recommends 50/50 protein
Most options within the scope of the dietary guidelines (blue line) are more environmentally sustainable than the current diet

(van de Kamp et al. 2018; Brink et al. 2016)

Sustainable options within each group

- Vegetable and fruits from the season
- White meat (chicken) < red meat
- Water < coffee, soft drinks, juices
- Potatoes < rice
- Fresh cheese < old cheese
- Mackerel < tuna
- Walnuts < cashew nuts
- Etc.
Menu of Tomorrow: EAT- Lancet improved (LP)
(Kramer & Blank, 2015; Natuur & Milieu)
Menu of Tomorrow: multiple constraints
(Kramer & Blonk, 2015 not published)

Future: sustainability more integrated
+ more constraints = planetary boundaries

EAT Lancet (2019)
Germany DGE (2019): start update FBDGs with optimisation modelling

Approach 4:
Theory of change:
Sustainable Development Goals

1. Additional rules
2. Demonstrate synergies
3. Optimisation modelling
4. SDGs as outcome
UN Sustainable Development Goals for 2030: Voedingscentrum contributes to at least 8 goals

NUTRITION IS ESSENTIAL FOR THE SUCCESS OF ALL THE SDGS

Optimal nutrition is essential for achieving several of the Sustainable Development Goals, and many SDGs impact nutrition security. Nutrition is hence linked to goals and indicators beyond Goal 2 which addresses hunger. A multisectoral nutrition security approach is necessary for success.

(Scaling up nutrition.org)
**Theory of Change**

“A representation of how and why a complex change process will succeed under specific circumstances”

1. Outcomes, modeled in causal pathways
2. Interventions (activities), leading to the relevant Outcome(s)
3. Assumptions
4. Rationales
5. Indicators
6. Narrative
SDG’s as ultimate outcome

(Stockholm Resilience Centre)
Netherlands

Work in progress:

In search for the next level

Review on indicators (2018)

- We conclude that GHGEs and LU fulfill the selection criteria and address most of the environmental impact of diets well.
- In the future, these indicators should be supplemented with an indicator addressing the nitrogen and phosphorous efficiency of food products.
Expert meeting (April 2019): selecting indicators

<table>
<thead>
<tr>
<th>Important indicators</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Greenhouse gas emissions</td>
<td>Appropriate for the short time, data available</td>
</tr>
<tr>
<td>2. Land use</td>
<td>idem</td>
</tr>
<tr>
<td>3. Water use (related to water scarcity)</td>
<td>idem, relevant for nuts and fruits</td>
</tr>
<tr>
<td>4. Nitrogen (efficiency)</td>
<td>Most urgent, but lack of data</td>
</tr>
<tr>
<td>5. Phosphorous</td>
<td></td>
</tr>
<tr>
<td>6. Soil quality &amp; biodiversity</td>
<td>To be developed, not yet measurable</td>
</tr>
</tbody>
</table>

- High synergies justify a small selection of indicators, but GHGE alone is not enough
- Not achievable to prioritize or weigh the indicators

Experts: Continue with 4 main messages

1. Eat no more than you need: Skip products outside the Wheel of Five.
2. Eat less meat (and more plant-based food)
3. Choose the more sustainable options within food groups
4. Waste as least as possible food

New advices to implement:
- Communicate an optimal amount of meat (1-2 times a week)
- Differentiate in target groups
Workshop Dutch Health Council (October 2019)

- Try to find a good focus on the contribution of the Health Council in the sustainable policy area.
- Building blocks for future advice, summarized in a short memo for the ministry.

Resulting in small advice: looking ahead (May, 2020)

- So far, the focus has been on health.
- However, there is increasing attention to the aspect of sustainability.
- The Health Council has explored how the perspectives of health and sustainability can be integrated in nutrition advice.
- A modular approach should be a priority, i.e. a piecemeal integration of data based on advances in knowledge.
Questions?