

## Sustainable diets

### – what do we know?

#### Editorial

Sustainability is an important issue and has implications for dietary advice.

Whilst sustainable diets tend to refer to greenhouse gas impacts, other environmental, economic and social factors, including nutrition, are also relevant which makes the breadth of the issue and the complexity of the evidence base overwhelming and the lack of solutions frustrating.

Yet, there is sufficient information available to confidently provide advice that is consistent with healthy eating and will have some environmental benefit.

This issue of *Vital* summarises key points from presentations and workshops on the topic organised by the Primary Food Alliance, as well as subsequent discussions with key experts.

Aspects of the evidence base and its limitations are explained and a glossary of sustainability concepts provided.

Insights from the available evidence on dietary strategies, which relates mainly to reducing greenhouse gas impacts, is provided with practical tips to incorporate in your practice.

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Veronique Droulez  
Editor, *Vital*  
Nutrition Manager, MLA

#### Key points

- > A sustainable diet considers several indicators to avoid unintended perverse outcomes, including greenhouse gas, water, land use and fossil fuel as well as nutrition.
- > Targeting broad food categories is unlikely to be effective because the variation in environmental impacts within a food category can be more important than the variation between food categories.
- > Minimising both the amount of resources used by all food production systems as well as their environmental impacts is the most effective strategy for agriculture to reduce their environmental impact. The best production practice will depend on the climatic, geographical and market conditions.
- > For the consumption phase, the amount of food and energy intake is the factor with the strongest influence on the environmental impact on the food supply.
- > Choosing nutrient-rich foods and reducing intake of nutrient-poor, energy dense foods, consistent with the Dietary Guidelines, is one way of reducing the amount of food (and hence resources) required to meet nutritional needs.
- > Reducing household waste is another effective pathway since it represents the cumulative loss of all of the resources required to produce, transport and prepare the food.

#### Conference presentations

The following presentations provided perspectives from agriculture, environmental science and nutrition on the topic of sustainability. They followed a series of meetings which brought together representatives from the public health and agricultural sectors and highlighted the benefit of cross sectoral discussions.

##### “Role of nutrition in sustainability” workshop, International Congress of Dietetics (September 2012, Sydney):

- What is involved in determining the sustainability of the diet? Tim Grant, environmental scientist, Life Cycle Strategies Pty Ltd
- How does the sustainability of different Australian primary foods compare? Stephen Wiedemann, agricultural scientist, FSA Consulting
- Dietary strategies for achieving health and environmental outcomes. Professor Manny Noakes, CSIRO – Food, Nutrition and Health Science

##### Nutrition Society of Australia conference (November 2012, Wollongong):

- Diet Quality – what does it mean and how can we measure it? Professor Adam Drewnowski, University of Washington, USA
- Sustainability Scorecard: Measuring the complex interactions of sustainability. Professor Laurie Buys, social scientist, QUT
- Sustainable agriculture – an Australian perspective. Dr Stephen Wiedemann, FSA Consulting
- Dietary strategies to achieve environmental and public health outcomes. Professor Manny Noakes, CSIRO, Adelaide

These activities were sponsored by the Primary Food Alliance, a collaboration of primary food industries, including Australian Egg Corporation Limited, Dairy Australia, Grains and Legumes Nutrition Council, Horticulture Australia and Meat and Livestock Australia (MLA).



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# The evidence base

When it comes to making sustainable choices, you can't always rely on intuition. To achieve the desired effect, a holistic approach and reliable data is necessary.

## More than one indicator is required

Most research on environmentally sustainable diets has focused on diet-associated greenhouse gas emissions (GHGE). There is limited evidence on greenhouse impacts relative to their role in a healthy diet or relative to other environmental factors required for food production, such as water and land use.

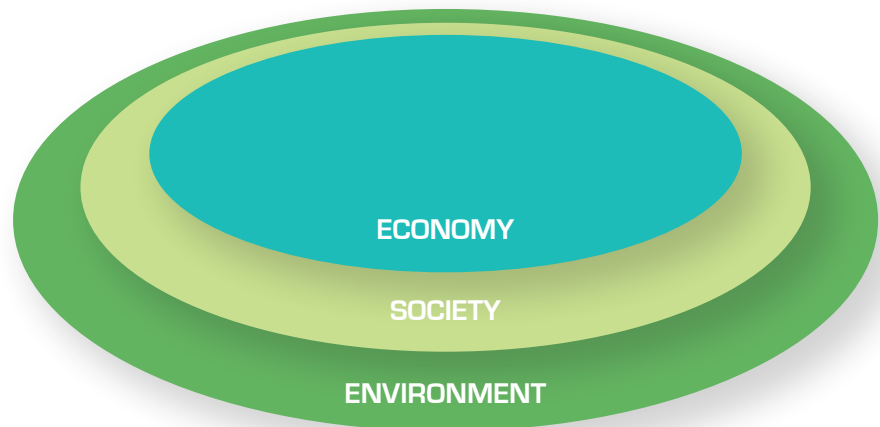
GHGE is not necessarily a good proxy for these other factors. Studies show foods or diets with a low greenhouse gas impact may not be the healthiest choice.<sup>1,2</sup>

Similarly, organic and free range production systems do not necessarily have the lowest greenhouse gas impact, particularly if more natural resources are required to produce a similar yield compared to conventional systems.

Using a set of key indicators, informed by robust, quantitative measurements, can help guide decisions around environmentally sustainable choices and diets so they are more likely to achieve the desired outcome and avoid unintended perverse outcomes.

From a nutritional perspective, metrics, such as the nutrient density index provides a universal measure applicable to populations in both developing and developed countries.

From an agricultural perspective, along with greenhouse gas impacts, the impact on and use of scarce resources such as arable land, water, fossil fuel and phosphorous



(for fertiliser) should also be considered. Relevant economic and social indicators may also need to be considered.

*See glossary of environmentally sustainable concepts for relevance of land and water use and resource use efficiency (explained in the human edible ratio).*

## Environmental impacts are variable

For any one product, the environmental impact will depend on where, how and even when it is grown.

In agriculture, practices are adapted to best suit climatic, geographical and market conditions and consequently, impacts measured in one region may not be

applicable to another region. Impacts are also likely to vary over time as producers need to change their production system to suit seasonal conditions or market demand.

This diversity in agricultural practices means targeting broad food categories is unlikely to be effective because the variation in environmental impacts within a food category can be more important than the variation between food categories. It also means that estimates of the environmental impact of a food produced in one region cannot be assumed to apply to the same food produced in another region or in another country or at another time. Similarly, in some cases, local food production may have a higher impact than an equivalent, imported product.

This variability and the limitations in measurement of environmental impacts make it difficult to develop and implement a simplified labelling system as has been attempted and failed overseas. According to FAO, improving efficiency of all food production systems by minimising both the amount of resources used as well as their impacts on the environment is considered the most effective strategy for agriculture.<sup>3</sup>

## References

1. Smedman A. et al. Nutrient density of beverages in relation to climate impact. *Food & Nutrition Research*, 2010; 54:5170.
2. Macdiarmid JI. Is a healthy diet an environmentally sustainable diet? *Proceedings of the Nutrition Society*, 2013; 72:13-20.
3. FAO (2011). *World Livestock 2011 - Livestock in food security*. Rome: Food and Agriculture Organization of the United Nations.



# Dietary advice

## for health and environment

Reducing the amount of food consumed without compromising nutrition is what matters most when it comes to reducing the environmental impact of the food supply.

### More for less with nutrient-rich foods

An analysis based on real diets representative of the French population reported a strong positive association between diet-associated greenhouse gas emissions (GHGE) and the amount of food and calories eaten. Essentially, the more you eat, the greater your carbon footprint.<sup>1</sup>

Differences in the total quantity of foods consumed by each individual explained a larger part of the diet-related GHGE variance than the carbon intensity or the energy density of the individual's diet. This means that the impact of substituting high carbon impact foods with foods with a lower impact is dependent on the amount of food required to match its energy and nutrient content. The authors showed how an isocaloric substitution of red meat with lower energy dense foods, such as fruit and vegetables, increased diet-associated GHGE, despite its lower carbon intensity, due to the larger quantity of food required.

Reducing the caloric intake of the overall diet to meet individual energy needs reduced diet-associated GHGE by approximately 2.4%, a dietary strategy with benefits for health and the environment, particularly in populations with a high prevalence of overweight and obesity.

### Dietary tips for reducing the environmental impact

- > Choose foods according to their nutritional and eating quality, rather than the quantity of food that can be purchased
- > Reduce food waste by carefully storing food and matching servings to individual needs.
- > Reduce overconsumption of nutrient-poor, energy dense foods
- > Eat adequate amounts of nutrient-rich foods according to the Dietary Guidelines

These findings suggest the most effective dietary strategies for reducing the environmental impact of food choices without compromising nutrient intakes are those which help individuals meet their energy and nutrient requirements with the least amount of food. This can be achieved by prioritising intake (in recommended portion sizes) of nutrient-rich core foods and reducing intake of nutrient-poor non-core foods, as recommended in the Dietary Guidelines.

In Australia, 36% to 41% of total energy consumed by adults and children, respectively, come from non-core foods.<sup>2,3</sup> Modelling conducted by the CSIRO based on the Australian diet has shown that non-core foods make a substantial contribution to diet-associated GHGE, even though individually, these foods are not necessarily carbon intense. Since such intakes are inconsistent with Dietary Guidelines, which recommend intakes of 0 to 17% of total energy from non-core foods, reducing their consumption would provide benefits for both health and the environment.

Wastage tends to move up the supply chain from developing to developed countries. In Australia, as a result of very efficient farming practices and better transport, storage and processing facilities, a larger proportion of food produced reaches markets and consumers. Consequently, a greater proportion of food waste is derived at the market and household level.

The environmental impact of household food waste is greater than the impact of waste earlier in the production chain because it represents the cumulative sum of the losses of the natural resources required throughout the entire production process. To illustrate this point, the environmental impact of wasting half of your meal includes wasting half the resources involved in the production of the meal's ingredients; half the transport costs; half the packaging and refrigeration; half the cooking; as well as the disposal of half the meal.

Hence, savings in household food waste have benefits right along the supply chain and can easily be implemented without requiring significant behavioural changes.

### Household food waste

Household food waste not only contributes to landfill, a significant source of greenhouse gas emissions, it also represents the cumulative loss of resources required to produce, transport and prepare the food.

Waste reduction is one of the most obvious and efficient strategies for reducing environmental impact. Considering approximately one-third of food produced for human consumption is lost or wasted globally every year, there are potentially many opportunities for reducing losses and waste throughout the production and consumption chain.<sup>4</sup>

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2. Rangan AM, Schindeler S, Hector DJ, Gill TP, Webb KL. Consumption of 'extra' foods by Australian adults: types, quantities and contribution to energy and nutrient intakes. *Eur J Clin Nutr.* 2009 Jul; 63(7):865–71. doi: 10.1038/ejcn.2008.51.
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4. Gustavsson et al. Global food losses and food waste, FAO, 2011



## Glossary of sustainability concepts

### Triple Bottom Line (TBL)

A term used for measuring achievement of sustainability goals which ensures all three aspects of sustainability are addressed, i.e. environmental, economic and social (includes health) factors. It ensures no one aspect of sustainability benefits at the expense of another.

### Life Cycle Assessment (LCA)

A method for measuring multiple impacts associated with the production, manufacture, distribution, purchase, consumption and disposal of a product across its entire supply chain.

LCAs identify ways to improve processes in the entire supply chain to reduce the environmental impacts associated with the product without shifting the burden elsewhere and generating negative impacts on other environmental factors.

### Water use

The environmental impact of water use depends on the source of the water and on how limited the supply is. A meaningful measure is the volume of water used from dams, creeks and other supplies (so-called 'blue water') that would otherwise have been available for other purposes rather than the amount used or lost directly from rainfall ('green water') where there is not a competitive use. Because use of water, where there is an abundant supply, has less environmental impact than when taken from 'stressed' catchments, a 'stress weighting' may also be added to the volume of water used.<sup>1</sup>

### Land use

There are three important aspects of land use which have implications for sustainability.<sup>2</sup>

- **Land transformation** (also called 'land use change'), especially where forests are cleared for food and fibre production and in so doing, releases greenhouse gas. This issue is less relevant in Australia where land clearing for agriculture is limited by strict legislation.
- **Land occupation** (also called 'land use') which measures the area of land used to produce food. More recent measurements are considering the quality of the land in terms of rainfall and soil type and hence its suitability for specific types of food production. This aspect is particularly relevant for Australia where rainfall is low, soil quality is poor and arable land is limited.
- **Land competition** (also called 'land stress') represents the level of demand for alternative uses of a particular parcel of land e.g. agriculture vs. mining vs. urban development. Consequently, agricultural production, such as extensive grazing, which is less reliant on competitive arable land, exerts less 'land stress' when compared to other developments.

### Human edible food ratio<sup>3</sup>

This measures resource use efficiency applicable to livestock products by measuring the ratio of human edible energy and protein that is produced for consumption vs. the feed consumed by the animal.

The ratio is more favourable for ruminants (i.e. beef and lamb) compared to pork and chicken due to their unique ability to convert

human inedible feed (i.e. grass) into human edible outputs. The digestive system of pigs and poultry is similar to that of humans and hence they are more reliant on grain and legumes (such as soy) and consequently, have a less favourable ratio.

### Grass fed

In Australia the majority of beef, lamb and goats are raised on natural pastures and this meat is described as 'grass fed', 'pasture fed' or 'free range'. The breed type, as well as changes in seasons, can influence the style and quality of red meat produced on grass. In Australia, at any one point in time, approximately 97% of cattle are located in a grass fed environment.

### Grain-fed

Grain-fed refers to meat from beef, lamb and goats which, in Australia, are grass-fed for most of their lives and fed a grain-based diet for a certain number of days. To be classified as grain-fed beef, for example, a heifer (female) must be fed for at least 60 days and a steer (male) more than 70 days. Cattle may be grain-fed because the quality of grass at certain times of the year or during poor seasons (such as droughts) is such that it doesn't contain enough nutrients for the cattle to grow to required weights. In addition, grain feeding cattle increases the red meat industry's ability to produce a consistent product – a consistent yield, quality and supply. In Australia, at any one point in time, approximately 3% of cattle are being grain-fed.

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Contact details: MLA Nutrition, Locked bag 991, North Sydney NSW 2059 Tel: 02 9463 9361 Fax: 02 9463 9173