Energy in, carbon out

TEAGASC and UCC research is looking at how reducing the amount of calories we consume could have a beneficial effect on climate change as well as on population health.

The issue of food consumption and sustainable diets in relation to climate change has received increased attention in recent years. However, in many countries food policy and dietary guidelines only address public health concerns, such as cardiovascular disease and obesity, with environmental sustainability receiving little or no attention.

The overconsumption of food and excessive energy intake has been linked to the rapid increase in obesity. Researchers in Teagasc and UCC have been looking at reducing this overconsumption as a potential strategy not only to target certain health risks, but also to alleviate some of the climatic impacts associated with food lifestyles. In addition to promoting a healthier lifestyle and prevention of chronic disease, promoting a healthy diet, which encourages the reduction in energy consumption to meet energy requirements, may result in the food system becoming less carbon intensive. The aim of this study was to determine if guidelines to reduce energy intake relative to energy requirements would result in a reduction in associated greenhouse gas emissions (GHGEs).

Consumption patterns based on the nationally representative food consumption data for Irish adults (www.iuna.net) were used to assess the potential impact of such a change on the environment.

Those consuming food beyond their energy requirement generated 24% more carbon emissions (an extra 1.5kg of CO_2 eq/day) than those eating within their requirement.

Table 1: Mean estimated energy requirement, mean daily intakes of energy, food and macronutrients, and mean daily GHGEs generated across groups of consumers with intake comparable to requirement and those with intake higher than energy requirement.

	Acceptable (EI=EER)		High (EI>EER)		Difference	
	n=128		n =151			
Mean daily intakes	Mean	SD	Mean	SD	High – acceptable	% difference
Estimated energy requirement (kcals)	2,325	457	2,404	514	79	3.4
Energy (kcals)	2,310	461	2,843	610	533	23.1
Total food (g/d)	3,042	899	3,414	1,013	372	12.2
Total GHGE (gCO_2 eq/d)	6,638	2,000	8,228	2,850	1,590	23.9
Protein (g/d)	91	22	110	30	19	20.4
MDI fat (g/d)	92	26	113	33	21	23.4
Carbohydrate (g/d)	261	63	320	81	59	22.7

When energy in does not match energy out

The National Adult Nutrition Survey (NANS) collected data on habitual food and nutrient consumption, body measurements and physical activity for 1,500 adults in Ireland. Conversion factors to estimate food-related GHGEs were applied to the food groups in the database. Energy intake (EI) was calculated for each individual, as well as their respective estimated energy requirement (EER). EER is calculated using a set of equations that take age, bodyweight, gender and physical activity into account. EER was subtracted from EI to identify those who were consuming within their requirement range (±150kcals/day), labelled as "acceptable", and those who were consuming at least 150kcals more than their requirement, labelled as "high". **Table 1** illustrates the difference in energy (requirement and intake), macronutrients, total food and GHGEs from all food in those consuming within requirement and those with intakes higher than requirement. Those in the high group consumed 12% more food than those in the acceptable group, which resulted in nearly 25% more energy and macronutrient intake. Those in the high consumption group also generated 24% more carbon emissions (approx. 1.5kg of CO_2 eq/day) than the acceptable group. When intakes of food groups were analysed individually, no one particular food group was accountable for the higher emissions; rather, those in the high-intake group were eating slightly higher amounts of every food, which collectively contributes to higher emissions. Not only were higher emissions being generated, members of this group were also consuming approximately 400 calories per day beyond their requirement. On this trajectory, they are likely to gain approximately 14kg (two stone) in bodyweight over a 12-month period.

Healthy and sustainable food policies

Strategies that promote measures to balance energy intake with energy requirement may result in less food being consumed, and hence fewer dietary GHGEs being generated. What is clear from these research results is that a small reduction across all food groups could be as beneficial to the environment as targeting specific foods; such an approach is also likely to have better health outcomes, as it would facilitate a better, more balanced diet. Hence, the development of dietary guidelines can easily incorporate strategies to concurrently address dietary climatic impact and positive public health outcomes.

Acknowledgements

This research was funded by the Department of Agriculture, Food and the Marine through the FIRM programme (grant no.13/F/527).

Authors

Sinéad McCarthy
Research Officer, Department of Agrifood Business and Spatial Analysis, Rural Economy and Development Programme, Teagasc Food Research Centre, Ashtown, Dublin 15
Correspondence: sinead.mccarthy@teagasc.ie

Maeve Henchion
Head of the Department of Agrifood Business and Spatial Analysis, Rural Economy and Development Programme, Teagasc Ashtown, Dublin 15

John Hyland
Post-Doctoral Fellow, Department of Agrifood Business and Spatial Analysis, Rural Ecoomy and Development Programme, Athenry, Co. Galway

Mary McCarthy
Professor of Marketing, Cork University Business School, University College Cork