

A new look at protein

Nutritional geometry: a tool for entangling the complexity of nutrition

Nutritional geometry is a simple modelling approach for dealing with nutritional complexity. Described in *The Nature of Nutrition*,¹ authored by Stephen Simpson and David Raubenheimer of the Charles Perkins Centre at the University of Sydney, it provides a multi-dimensional nutrient space for mapping the health consequences of macronutrient balance and interactions between nutrients and food choices. It has the potential to better understand inconsistencies in findings reported in population studies which tend to be focused around single nutrients and foods. Using this approach to understand the feeding behaviour of insects and other animals, they have developed the Protein Leverage Hypothesis which proposes that a change in the ratio of protein to fat and carbohydrate in the diet may play a central role in increased energy intake.

Protein dilution determines energy intake

The proportion of protein relative to other macronutrients as a determinant of health outcomes, in particular obesity, is gaining attention. The Protein Leverage Hypothesis proposed by Stephen Simpson and David Raubenheimer predicts that when the proportion of dietary protein falls, energy intake increases in an attempt to gain

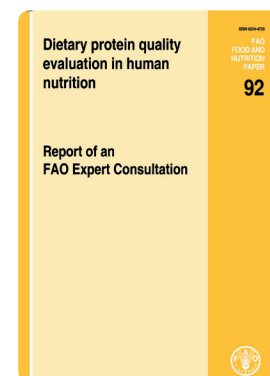
limiting protein. This is because intake of protein is more strongly regulated than carbohydrate or fat and so protein intake tends to remain constant whereas intakes of carbohydrate and fat follow more passively with their concentrations in the diet.

According to this hypothesis, the decrease in percent dietary protein from 14% to 12.5% between 1961 and 2000 in the USA required a 14% increase in energy from carbohydrate and/or fat to maintain protein intake.² When protein intake is inadequate, we increase food and thus energy intake to achieve our protein target.

Simpson and Raubenheimer suggest that this dilution of protein energy by carbohydrate and fat has contributed to an increase in energy intake and consequently, the obesity epidemic. Evidence from a meta-analysis³ of published experimental trials confirms that dietary energy intake is driven by the balance of macronutrients in the diet. More research is required to determine individual protein targets since these will most likely vary by life stage, physical activity level, BMI or disease state.

Better methods for measuring protein

As the world's population grows and natural resources become scarce, a recent FAO report⁴ highlights the importance of being able



Dietary protein quality evaluation in human nutrition, FAO Food and Nutrition Paper n.92 (published on 15 February 2013)

to accurately define the amount and quality of protein required to meet nutritional needs.

This *Dietary protein quality evaluation in human nutrition* FAO report⁴ recommends the use of a new protein quality measure called the 'Digestible Indispensable Amino Acid Score', or DIAAS. This measure recommends the use of digestible or bioavailable amino acids content to evaluate the protein quality of a food. The previous method, the 'Protein Digestibility Corrected Amino Acid Score' or PDCASS, was based on a prediction of dietary protein utilisation and may have overestimated the protein quality of plant-based proteins.

The FAO report also highlights the need to assess protein requirements by functional health outcomes, rather than nitrogen balance. This is particularly relevant for the elderly where increasing evidence suggests higher protein requirements are required to prevent sarcopenia, particularly in combination with progressive resistance training.

References

1. Simpson SJ, Raubenheimer S. 2012. *The Nature of Nutrition: A Unifying Framework from Animal Adaptation to Human Obesity*. Princeton University Press, Princeton.
2. Simpson SJ, Raubenheimer S. Obesity: The protein leverage hypothesis. *Obesity Reviews*, 2013; 6(2):133-142.
3. Gosby A, Conigrave AD, Raubenheimer D, Simpson SJ. Protein leverage and energy intake. *Obesity Reviews*, 2013. pp. n/a - n/a
4. FAO. 2011. *Food and Nutrition Paper: Dietary protein quality evaluation in human nutrition - Report of an FAO Expert Consultation*. Rome.

IUNS symposium on protein

The International Meat Secretariat (IMS) Human Nutrition and Health Committee sponsored a symposium titled 'Protein requirements for optimal health throughout all life stages' at the International Union of Nutritional Science (IUNS) 20th International Congress of Nutrition in Granada. In this symposium, research related to the findings of the FAO report were presented.

The IMS committee is comprised of nutrition and dietetic specialists from various meat organisations around the world. Speakers included Professor Paul Moughan (Riddet Institute, Massey University, New Zealand) who chaired the recent FAO Expert Consultation on Protein; Professor Rajavel Elango (University of British Columbia); Professors Nancy Rodriguez (University of Connecticut); and Caryl Nowson (Deakin University, Australia).

Proceedings, presentations and the symposium can be viewed at the IMS website <http://www.meat-ims.org/>

The first 1,000 days – the critical

Eliminating poverty and hunger for sustainable development

The United Nations Secretary General's 'Zero Hunger Challenge' adopted by leaders at the Rio20+ Summit in 2012 is central to efforts towards sustainable development.

With the Millennium Goals expiring in 2015, a post-2015 sustainable developmental framework is being developed by global policy-makers with food and nutrition security a major concern. The Second International Conference for Nutrition in 2014 is part of this process and at the Technical Preparatory Meeting in Rome late last year, the importance of a common vision on nutrition across sectors was a key conclusion.

The meeting emphasised the need for multi-stakeholder involvement as well as an integrated approach which addresses the three prevalent forms of malnutrition – undernutrition, micronutrient deficiencies and obesity – since these are starting to co-exist with maternal and child nutrition a key target group.



RIO+20
United Nations
Conference on
Sustainable
Development

For more information on the United Nations Conference on Sustainable Development, visit <http://www.uncsd2012.org/index.html>

Nutrition status at conception and during pregnancy is critical for both mother and baby

In 2008, the *Lancet*¹ first highlighted the importance of the first 1,000 days (the period from conception to a child's first birthday) as the most crucial time for optimal nutrition for lasting benefits through life.

A new *Lancet*² series was published in June 2013 which provides an overview of the current global status of maternal and child nutrition and recommendations for effectively addressing immediate and underlying causes of poverty and hunger. This *Lancet* series will inform the post-2015 sustainable development agenda.

Reducing stunting is a priority since this compromises cognitive and physical development and consequently, the ability to earn an income. Use of supplements to prevent micronutrient deficiencies is recommended pre-conception, during pregnancy and while complementary feeding to reduce the risk of foetal growth restriction, small for gestational age babies, risk of death and child stunting.

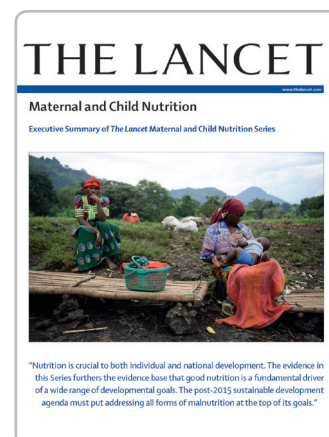
Micronutrient deficiencies of particular concern include vitamin A and zinc deficiencies which increase the risk of infection and ultimately, survival; and iron and iodine deficiencies which prevent children from reaching their developmental potential due to their role in cognitive function.

A combination of nutrition education with iron-rich complementary foods is recommended

Whilst micronutrient supplementation is recommended, food-based strategies which include a variety of nutrient-rich foods is considered a more sustainable strategy.

At the recent International Union of Nutrition Sciences conference in Granada, several presentations emphasised the importance of including animal foods as complementary foods to combat micronutrient deficiencies, enhance immune function and improve health outcomes linked to growth and development.

It was suggested that efforts may be required to encourage the use of meats as a complementary food as poor food preparation skills and understanding of the importance of iron appear to be common barriers to its inclusion in a child's diet. This is consistent with insights from parents which informed the development of MLA's



The 2013 Maternal and Child Nutrition Lancet Series informs the post-2015 sustainable development agenda

To download the *Lancet* audio and video overview summaries, visit <http://www.thelancet.com/series/maternal-and-child-undernutrition> and <http://www.thelancet.com/series/maternal-and-child-nutrition>

References

1. Maternal and Child Nutrition Series; *Lancet* 2008; 371; 243-621.
2. Maternal and Child Undernutrition Series; *Lancet* 2013; 382; 427-569.

nutrition resource, *How to make every bite count* which showed that they did not know how to prepare meat for their babies and wanted simple meal ideas to feed baby as well as the whole family.

To download the IUNS 20th International Congress of Nutrition book of abstracts, visit <http://icn2013.com/pages/abstracts-submission>



cal nutrition window

Updated *How to make every bite count* brochure

This MLA brochure has been updated to reflect the new NHMRC Infant Feeding Guidelines,¹ released in February 2013, as well as feedback received from mums and healthcare professionals who are using the brochure in their practice. Specific recommendations from the Guidelines incorporated into the brochure include:

- The importance of introducing solid foods at around six months of age to meet nutritional requirements and decrease risk of allergy development.
- The order of introducing solids; as long as iron-rich foods are included in first foods, foods can be introduced in any order and at a rate that suits the infant.

The *How to make every bite count* brochure provides parents with a nutritious guide to introducing solids, including recipes suitable for feeding the whole family from the one meal.

Reference

1. National Health and Medical Research Council. Australian Infant Feeding Guidelines. Canberra: NHMRC, 2013.

Recipe

Beef & Veggie Pasta Salad

Serves: 4
Preparation time: 15 mins
Cooking time: 30 mins

Ingredients
 600g rump steak, trimmed of fat
 1 1/2 tbsp olive oil
 800g pumpkin, peeled, seeded, cut into 1.5cm cubes
 250g farfalle pasta
 150g green beans, trimmed, cut into 3cm lengths
 100g baby spinach leaves
 125g fresh ricotta
 2 tbsp toasted pine nuts, to garnish

Method
 1. Preheat oven to 200°C (180°C fan forced) and place pumpkin on a tray lined with oil and roast for 25-30 minutes or until golden and tender. Set aside.
 2. Cook pasta in a large saucepan of boiling water according to packet instructions, adding beans for the last 2 minutes of cooking time. Drain well.
 3. Meanwhile, heat a large non-stick frying pan or char grill over a high heat. Brush steak with 2 teaspoons olive oil. Cook steak for 2-3 minutes each side for medium or until cooked to your liking and rest for 5 minutes, loosely covered with foil.
 4. Toss pasta, beans, pumpkin, sliced steak, spinach, ricotta and remaining olive oil together. Serve garnished with pine nuts.
 5. Use cooked ingredients to adapt the family meal for different developmental stages. See examples on the following page.

Silky Smooth
 Blend 2-3 slices (30g) beef with 3-4 cubes of roasted pumpkin, some spinach leaves and ricotta, adding 1-2 tbsp boiling water if necessary.

Lumpy mushy
 Pulse 2-3 slices (30g) beef with spinach leaves until partially smooth and mix with 3-4 pieces of mashed pumpkin and ricotta.

Finger Food
 Place some slices of beef cut into smaller pieces, green beans, cubes of pumpkin, and pasta on a plate to eat as finger food.

Toddlers
 Place some of the tossed pasta in a small bowl and serve with a fork.

How to Make every bite count!
 A guide to nutritious family meals for babies and toddlers.

To order your free copies, please call 1800 550 018 or alternatively download the brochure online at www.beefandlamb.com.au/makeeverybitecount

AHWW – The Live Well Plan

MLA is supporting DAA's Australia's Healthy Weight Week (AHWW) (17–23 February 2014), an initiative of the Dietitians Association of Australia, to raise awareness of the importance of achieving and maintaining a healthy weight and a healthy lifestyle in Australian adults.

The theme of AHWW 2014 is 'Eat better, feel better, see an APD!' MLA have used their findings from the 'What's Cooking' report to inform the advice provided to Australians on cooking up a healthy storm in 2014. Copies of *The Live Well Plan* resource, *Entice Summer* and tips to cook the perfect steak have been included in event satchels which are being distributed to dietitians holding events Australia wide.

Visit <http://www.healthyweightweek.com.au> for more information

Back to school campaign

MLA and Accredited Practicing Dietitian Kate Di Prima have devised a handy recess and lunch meal plan, lunch box portion template and top lunch box tips for parents and kids – all ideas for tracking children to the top of the lunch box class.

The perfect lunch box formula

fruit for a healthy body
 whole piece, one-quarter of fruit salad, small tub of fruit or berry yoghurt

wholegrain carbohydrate for energy to learn and play
 multigrain bread, rump, pita, flat bread, crackers, crispbread, rice cakes, fruit muffin, wholemeal bread, toast, oat, wholemeal popcorn

protein for growth and strong muscles
 beef, lamb, fish, chicken, legumes, beans, tofu

dairy for strong bones and teeth
 reduced fat milk, yoghurt, cheese, custard

vegetables for happy tummies
 sliced in sandwich, rump or pita, chopped veggie sticks with dip

water to keep you hydrated

Visit <http://www.beefandlamb.com/lunchbox> to download the campaign materials.

New FAO report

Tackling climate change with livestock

The 2013 FAO report, *Tackling climate change with livestock*,¹ identifies several options for the livestock industry to reduce greenhouse gas emissions. This report follows a previous FAO report published in 2006 titled 'Livestock's Long Shadow'.² Since the release of the first report, improved data has become available which has enabled more detailed analyses to better understand how the livestock industry can make a positive contribution to climate change mitigation.

Improving production efficiencies offers the greatest potential

The direct link between greenhouse gas (GHG) emission intensities and the efficiency with which producers use natural resources suggests that improving production efficiencies will make the greatest impact on climate change mitigation.¹

The FAO report estimates that if producers in a given system, region and climatic zone adopted the technologies and practices currently used by the producers with the lowest emission intensity, a 30% reduction of GHG would be possible.¹

Concrete actions recommended for reducing emissions include better feeding practices and management of grazing lands to create carbon sinks in extensive farming systems; use of less energy-intensive feed sources, more sustainable sources of power and manure management practices for recycling nutrients and energy contained in manure in intensive systems; and improvements in breeding, animal husbandry and animal health.¹

The greatest potential for mitigation as well as improving food and nutrition security will therefore be in systems operating at low productivity in developing countries. Increased productivity associated with improvements in production efficiencies, particularly of smallholder farmers, can also make a positive contribution to food and nutrition



security through poverty alleviation and by providing a local supply of nutrient-rich food.

Where emission intensities are already relatively low but the volume of production and emissions remain high, as in many developed countries, small reductions in emission intensity can result in large emission reductions. However, in these systems, additional reductions can be achieved by reducing waste at the consumption level through the promotion of nutrient-rich foods, smaller portion sizes and utilising preparation and storage strategies to reduce food waste.

Global action to reduce GHG emissions

The urgency for global action involving all sector stakeholders is strongly recommended to inform the design and ensure the implementation of cost-effective and equitable mitigation strategies. This will

require a mix of supporting policies, incentives, research and on-the-ground extension work to support adoption of new practices and technologies.

FAO's commitment to practice improvement and sector sustainability is reflected in its active involvement in the Agenda of Action for Sustainable Livestock – a global multistakeholder partnership dedicated to improving practices for a more efficient use of natural resources. The current focus is in practice efficiency; grassland management; and manure management where mitigation potential of different technologies will be identified and assessed and guidance for local and system-specific solutions provided.³

The LEAP (The Livestock Environmental Assessment and Performance) partnership is another cross sectoral effort with FAO involvement, harmonising and developing common metrics to define and measure environmental performance of livestock supply chains.⁴ This will provide a better understanding of the size, sources and pathways of emissions.

Safeguards to avoid potential negative side-effects of efficiency gains such as animal diseases, poor welfare, and soil and water pollution and ensure rural development and food and nutrition security will also be considered.

References

1. FAO. 2013. Tackling climate change through livestock – A global assessment of emissions and mitigation opportunities. Gerber PJ, Steinfeld H, Henderson B, Mottet A, Opio C, Dijkman J, Falucci A, Tempio G. Rome.
2. FAO. 2006. Livestock's long shadow – Environmental issues and options. Steinfeld H, Gerber PJ, Wassenaar T, Castel V, Rosales M, De Haan C. Rome.
3. Livestock Dialogue. 2013. Global agenda for sustainable livestock. <http://www.livestockdialogue.org/en/>
4. FAO. 2013. Livestock Environmental Assessment and Performance (LEAP) Partnership. <http://www.fao.org/partnerships/leap/en/>

Eating according to Dietary Guidelines for good health and climate change mitigation

Modelling conducted by the CSIRO shows that non-core food groups account for 27% of diet-related GHG emissions.¹ Compared to the average Australian diet, eating according to the Foundation Diet (foods from the Five Food Groups and unsaturated spreads and oils) would reduce energy intake and GHG emissions. Although red meat makes the greatest contribution to GHG emissions, since current intakes are consistent with the Dietary Guidelines, changes in non-core food intake had the greatest impact on diet-related GHG emissions.

Reference

1. Hendrie GA, Ridoutt BG, Wiedmann TO, Noakes M. Greenhouse Gas Emissions and the Australian Diet – Comparing Dietary Recommendations with Average Intakes. *Nutrients*, 2014; 6:289-303.

This publication is published by Meat & Livestock Australia Limited ABN 39 081 678 364 (MLA). Care is taken to ensure the accuracy of information in the publication, however, MLA cannot accept responsibility for the accuracy or completeness of the information or opinions contained in the publication. Readers should rely on their own enquiries in making decisions concerning their interests. Reproduction in whole or in part of this publication is prohibited without prior consent of MLA. ©2014. Published January 2014.

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