Riddet Review

June 2011 Issue 06
Riddet Institute
Private Bag 11 222
Palmerston North
New Zealand
www.riddet.ac.nz

Riddet Institute
FOOD | INNOVATION | HEALTH

Professor Peter Munro, the new Chair of Food Materials Science at the Riddet Institute

Editorial

As we approach the mid-point of the year and the depths of winter, activity within the Riddet Institute is at its peak. Our Primary Growth Partnership (PGP) programme has commenced, with the appointment of the first Chair in Food Materials Science, Professor Peter Munro. Professor Munro is based in Palmerston North and is now assembling a team to work on this new programme.

A major event at the end of March in Auckland was the International Symposium on Dietary Protein Quality, hosted by the Riddet Institute, FAO and Health Canada. The Symposium was heralded by delegates as a great success. The papers from the invited speakers for that event will be published in the British Journal of Nutrition later this year. The Symposium was followed by an FAO Expert Consultation, where Professor Paul Moughan, co-director of the Riddet Institute, was elected Chair. This is the first time FAO has held such a meeting of experts in Australasia. The report on dietary protein quality prepared from the Consultation is expected to be released in August this year and will have implications for many years on the way protein quality is described in scientific terms and therefore on world trade in protein.

Work has begun on our next international conference, Food Structures, Digestion and Health, to be held in Palmerston North in March next year. This will be a significant event with some well-known international scientists as keynote speakers. More details are on www.foodstructuresconference.co.nz

Riddet Institute Associate Investigator Kate McGrath has been appointed the new director of the MacDiarmid Institute, a CoRE hosted by Victoria University of Wellington. The Institute was thrilled to hear this and we extend our congratulations to her and we will continue to work closely with the MacDiarmid Institute in the future.

Finally, like the rest of New Zealand we are looking forward to the Rugby World Cup in September and October and will be launching a book, "The History of Agri-Food Innovation in New Zealand", in Palmerston North in the week that two pool matches are being played here. We hope to enthuse the many international visitors to the city about this country's innovativeness and great tradition in food production and quality.

Paula McCool
Communications Officer

Honour for co-director

Professor Paul Moughan has been admitted as a Fellow of the Royal Society of Chemistry (FRSC), which is based in Cambridge, England.

He was invited to apply for the fellowship in recognition of his work on protein and amino acid analysis; development of bio-availability assays for amino acids; and food evaluation science generally.

2011 is the International Year of Chemistry.

Closer Relationship With the MacDiarmid Institute Desirable

The Riddet Institute (via Massey University) and Victoria University of Wellington have signed a Memorandum of Understanding that will further consolidate the Institute's relationship both with the MacDiarmid Institute and Victoria.

Riddet Institute General Manager Mark Ward said, "We see this agreement as strengthening the working relationship between the two CoREs in particular, where we already have appointments of Principal and Associate Investigators, who are working on protein molecular structures. But also we know there will be further opportunities under the PGP programme."

One of the primary motivations for the MOU is to encourage appointment of joint post-doctoral students, who could be based at either Victoria or Massey to work on new projects of interest to both the Riddet and MacDiarmid Institutes.

New director-designate of the MacDiarmid Institute, Associate Professor Kate McGrath, is a member of the Riddet Institute.

Helping to Solve World Protein Shortages

By 2050 the demand for animal protein will be twice what we are capable of producing now, so we need innovative and sustainable ways of addressing food production. Given the limitations of agricultural resources (principally land and water) and sustainability considerations (greenhouse gases and energy use), we are looking for a large increase in productivity and sustainability.

To contribute towards solving the problem, the Riddet Institute and Wageningen University in the Netherlands are collaborating on the PROTEOS programme, which was launched in October in the Netherlands by our Minister of Agriculture, the Hon. David Carter. Wageningen University is the premier agri-foods research university in Europe.

PROTEOS will formulate novel solutions that involve substituting and extending future animal-based protein sources, transforming the protein supply chain. The programme will address a range of solutions in the context of technical, social, cultural and economic feasibility. An array of initiatives will allow sustainable systems of animal production to meet future needs, such as raising efficiency by increasing the production of high-quality protein per unit input, and developing suitable replacement proteins. Such solutions will need to be matched to the scale of projected market opportunities as well as to regional and local needs, particularly in developing economies. It is generally recognised that production of animal-derived foods requires more land resources than plant-based foods, although estimates vary from 1.3 times to 10 times or more.

The PROTEOS programme has adopted these propositions:

- Future protein demand requires enhancing the sustainable production of protein from all possible sources.
- Current plant-based protein sources will become increasingly important in future human nutrition while animal nutrition will rely increasingly on alternative protein sources.
- Shifting protein sources up the supply chain will be the primary basis to meet future protein demand.
- Plant-based substitutes or extenders for animal protein foods will require enhancements of nutritional, sensory and textural properties.
- Successful extended and substituted animal foods will be those that take into account socio-economic needs and cultural aspects.
- ... and it has to taste good.

The PROTEOS team involves scientists from a wide range of disciplines from Massey University and other Riddet Institute partners, and the University of Wageningen. Areas of expertise include food science and engineering, nutrition (animal as well as human), economics and consumer studies.

First steps will be a comprehensive mapping of the problem and potential solutions, including mapping the technological, socio-economic and geopolitical landscapes. This will allow the identification of relevant work that has already been completed and assessment of the viability and impact of potential solutions.

Possible partial solutions that are to be considered include:

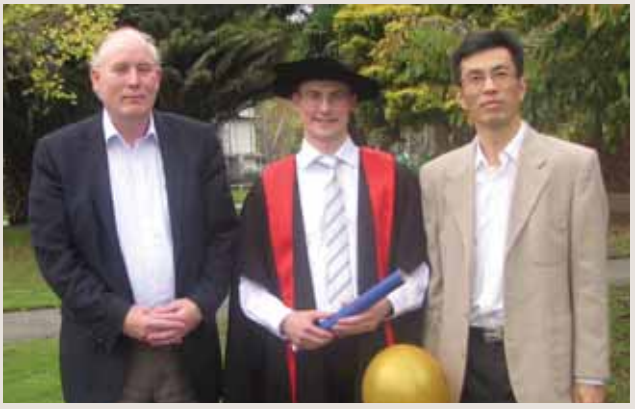
- use of novel sources of proteins (e.g. from insects or algae – particularly for animal feed),
- use of lower input proteins as extenders for high value animal proteins,
- use of plant-based proteins for substitution or extension of animal proteins,
- development of niche high-value protein ingredients as nutritional balancers,
- wider use of food waste and of co-products from non-food applications such as biofuels for animal nutrition.

The project and its workstreams are currently being scoped out by Dr Mike Boland, who is leading the project from the Riddet Institute end.

Riddet Scholar Graduates

Daniel Ries graduated Doctor of Philosophy in Food Technology at a ceremony in Palmerston North in May. His thesis was on 'the Antioxidant Activity of Milk Protein in Model Oil-in-Water Emulsions' and he was supervised by Professor Harjinder Singh and Dr Aiqian Ye.

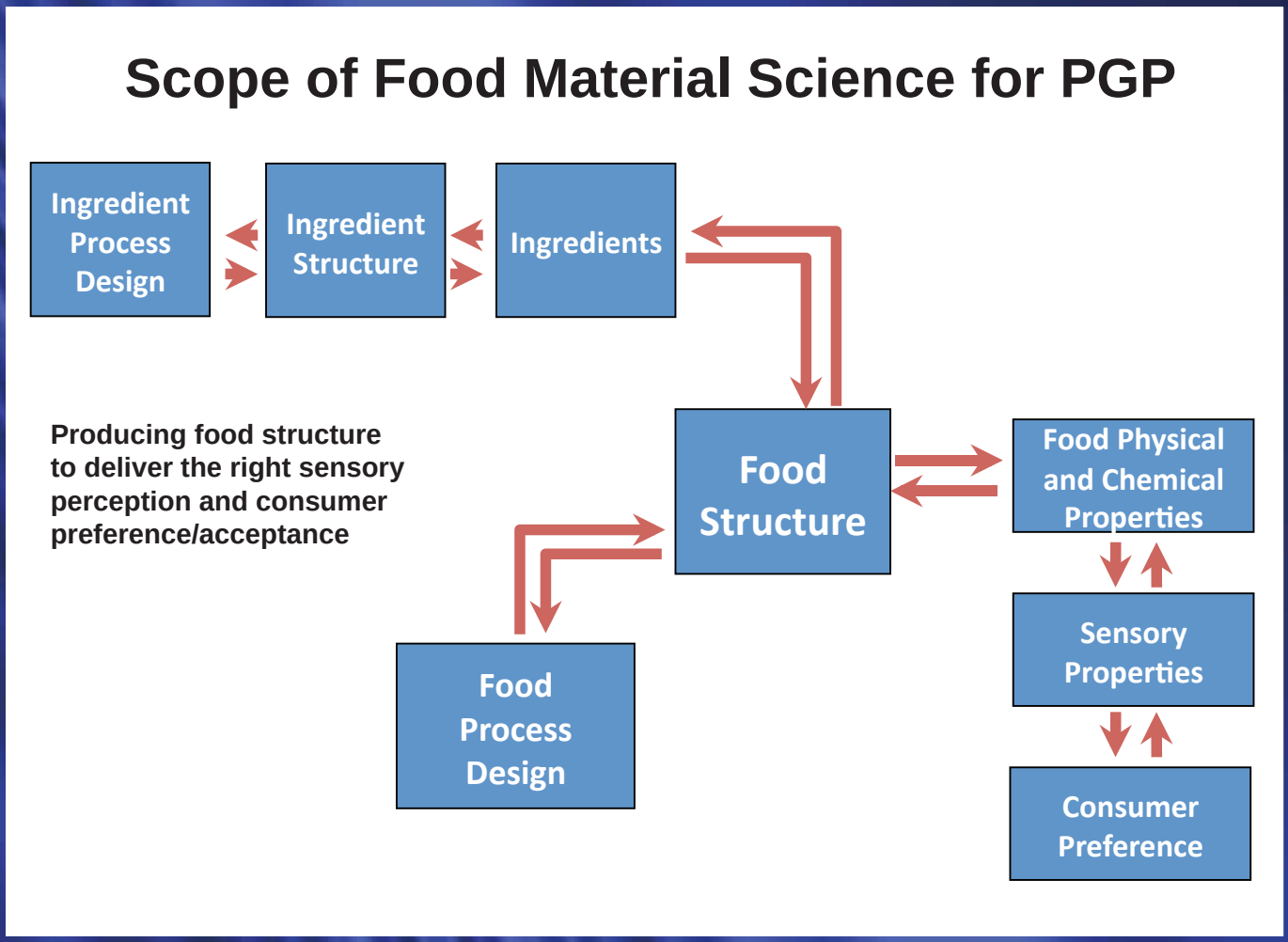
Daniel completed his studies in late 2009 and returned to his native Germany to work for KFT Chemieservice GmbH in Griesheim. The company services other companies that need to register their chemicals (produced in the EU or imported into the EU) under the new EU chemical regulation "REACH". Currently he is dealing with the generation or analysis of "exposure scenarios" – used to describe the safe use conditions of a chemical substance. Such exposure scenarios are incorporated into material safety data sheets (MSDS), also a legal requirement in the EU.



Dr Daniel Ries with Professor Paul Moughan and Dr Aiqian Ye

New Research Area Will Produce Unique Understanding

Professor Peter Munro, the new Chair of Food Materials Science at the Riddet Institute, is pleased to be back in the university environment, where, he says there is more freedom to explore those questions thrown up by scientific research and their application to commercial needs. Professor Munro is no stranger to Massey University. He was Professor of Food Engineering from 1984 to 1993, and then part-time until 2002 in a joint appointment with Fonterra.



Professor Munro's appointment comes out of the dairy Primary Growth Partnership agreement between the Government, DairyNZ and Fonterra, which aims to drive transformational change in the dairy industry, including boosting research into innovation in dairy foods.

Formerly General Manager, Ingredients Innovation at Fonterra, Professor Munro will be examining how ingredients and process design affect food structure and subsequently the sensory properties and consumer preference.

His first objectives over the next few months will be to work with Fonterra to establish specific projects and capabilities, in detail; what expertise exists in the various research organisations around New Zealand; and who the world experts in this field are.

He anticipates there will be a lot of synergies with the Riddet Institute Food Structures platform where there is expertise in textural and rheological measurement; and the measurement of food structures.

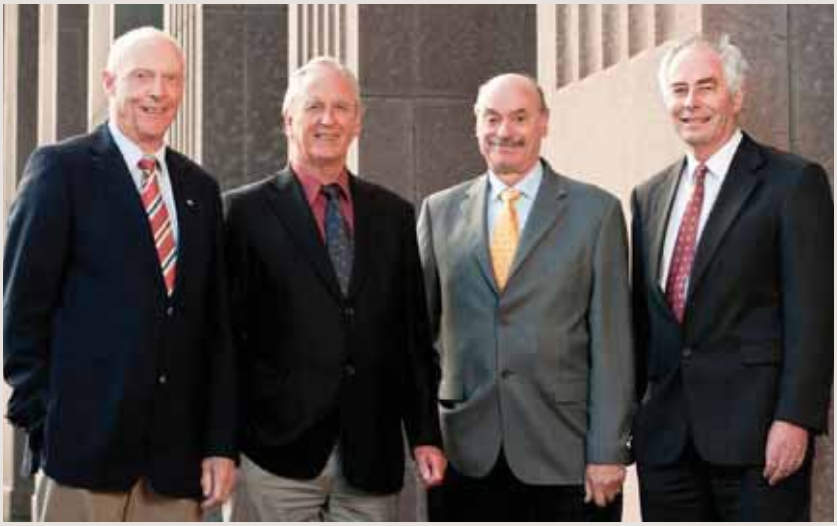
Upon his new appointment, Professor Munro ceased to be a member of the Riddet Institute Scientific Advisory Panel, and a search is now underway for another member with food engineering and industrial application skills.

Thought Leadership Team to Tackle Major Global Issues

The Institute has brought together an agri-food thought leadership team to identify high-level trends and discontinuities in the sector, and to map out an Agri-Food strategy that will identify future needs for research, development and education.

The team is led by Dr Kevin Marshall, former CEO of ViaLactia (Fonterra's Biotech arm) and former CEO of the NZ Dairy Research Institute and CTO for the NZ Dairy Board and Fonterra, with team members Dr Russ Ballard (Chancellor, Massey University), Mr Graeme Avery (President and CEO Sileni Estates Ltd.) and Dr David Johns (DairyNZ). The team is supported by Dr Mike Boland (Riddet Institute) and Dr Kevin Heagney (Centre for Agribusiness Policy and Strategy, Massey University).

The need for a strategy arises from the unprecedented change facing the world as we move into the 21st century. The population is expected to peak at over nine billion by 2050; mass communication and social networking means messages can go around the world to most of the population in minutes; small changes in atmospheric temperature are bringing about massive changes in the weather; fossil fuels are expected to rise to two to three times their current price; fresh clean water is becoming scarce and all production methods can be expected to be mandated to become sustainable sooner rather than later.



From left Dr Ballard, Dr Marshall, Mr Avery, Dr Johns.

Agri-food is the backbone of New Zealand's economy and the Riddet Institute is playing its part to prepare for this future. The findings of the team so far have been significant and the published strategy promises to shake up many assumptions prevalent in both government and industry about the agri-food sector.

Personalised Nutrition and the Power of Combinatorial Foods

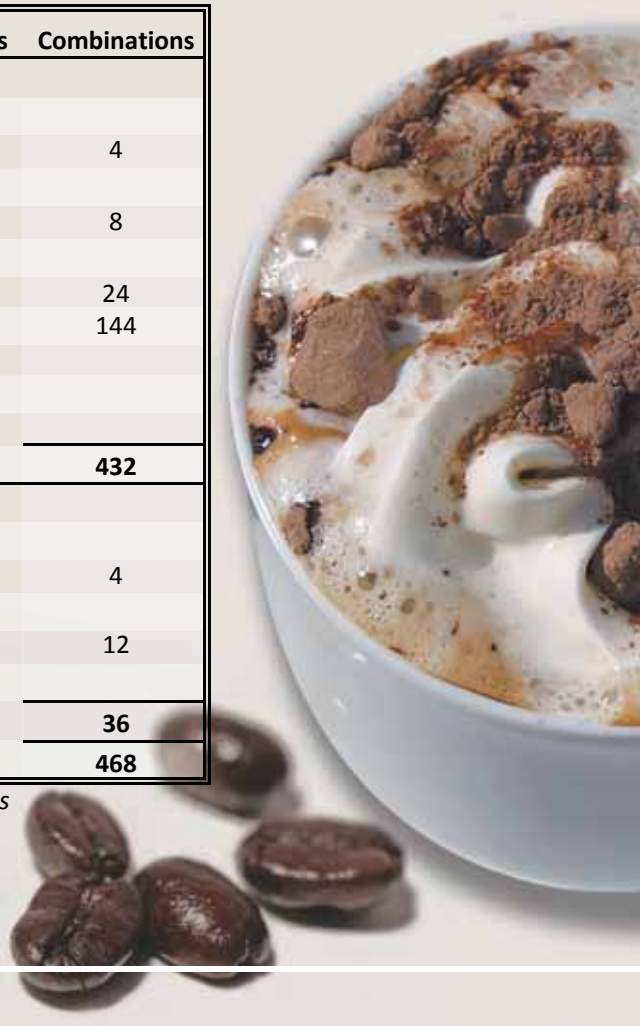
It has long been clear that different people respond differently to different kinds and amounts of food. In the late 1990s it was believed that individual differences in genotype due to single nucleotide polymorphisms (SNPs) might provide a basis for individual nutritional health, thus was born the field of nutrigenomics. As it turned out, nutrigenomics did not yield the quick gains that had been anticipated and it turns out that the additional effects of multiple gene copies, epigenetics disease history, medications and lifestyle factors must be taken into account when developing a "nutritional phenotype" i.e. the description of the individual that describes their individual nutritional needs. Nevertheless, the era of personalised nutrition is rapidly approaching.

One of the big questions is how to provide nutrition to individuals in today's mass processed market. One solution to this is to divide people into clusters of roughly similar nutritional phenotypes and market nutritional products on that basis. This is the approach being promoted in the EU Framework 7 programme "Food4Me", which started in April this year and in which the Riddet Institute will be participating. A more elegant solution can be provided through the application of mass customisation and point-of-sale formulation. Mass customisation involves selection of alternatives that accumulate in a combinatorial fashion. A simple example is the way coffee is ordered today – in a typical cafe there are 468 ways of ordering a cup of coffee (Table 1). Dell Computers has used mass customisation so that over 3 million possible configurations are available for some models of their computers (example was Dell Inspiron 600 Laptop), just through selection of on-line options.

The opportunity for mass customised foods to meet personalised nutrition needs was recognised at Fonterra about 8 years ago, and resulted in the POSIFoods project (POSIFoods stands for 'Point of Sale Individualised Foods'), which led to a family of patented solutions. POSIFoods is an operating model based around a central information system that stores a person's data (the constant

Coffee variables[1]				Choices	Combinations
		White coffee			
Coffee	regular	decaf		2	
	one shot	2 shots		2	4
Size	small cup	large cup		2	8
Milk	full cream	low fat	soy	3	24
			cappuccino	6	144
Format	flat white	latte	cinnamon		
			cappuccino		
	moccachino	cappuccino	chocolate		
Sweetener	none	sugar	equal	3	**432**
		Black coffee			
Coffee	regular	decaf		2	
	one shot	2 shots		2	4
Size	short	long	americano	3	12
Sweetener	none	sugar	equal	3	**36**
					468

1. *Excludes ristretto, macchiato and other less common combinations*



part of the nutritional phenotype) and a sophisticated set of algorithms that can compute their specific nutritional requirements, including a response to any situational factors and preferences that may be input at the time of ordering. The delivery is through a geographically distributed series of point of sale outlets that can provide, depending on the outlet and the customer's need, either a ready-to-consume drink or snack (convenience mode), or a set of ingredients ready to make a meal at home. It could also potentially be used in "POSI" restaurants (food service mode), although this mode remains largely unexplored.

The Riddet Institute (then the Riddet Centre) was a partner, together with Fonterra and BASF, in developing the POSIFoods technology, and is now looking for ways to take it to market with a suitable industry partner.

"Dietary Protein Symposium Attracts World's Best Scientists to New Zealand"

The International Dietary Protein Symposium held in Auckland at the end of March in conjunction with FAO and Health Canada saw many of the world's leading scientists in protein and human nutrition attend. All continents were represented and the proceedings will appear in a special supplement to the British Journal of Nutrition later this year.

Organising committee member Dr Barbara Burlingame, FAO, sets the scene for the Symposium

Dr Ricardo Uauy was inducted as member of the Chilean Academy of Medicine in 2002.

Professor David A. Bender is Professor of Nutritional Biochemistry at University College London

Dr Anura Kurpad is head of the division of nutrition, St John's Medical College, India

In Brief

Professor Warren McNabb, a Riddet Institute Principal Investigator, has been appointed the new Research Director at AgResearch. He was previously General Manager, Food & Textiles. AgResearch is undergoing a restructuring of its senior executive team.

Professor Jim Mann, a Principal Investigator at the Riddet Institute, received an honorary doctorate in June from the North-West University in South Africa.

In May Professor Harjinder Singh gave an address at the Food Science and Technology Forum organised by A*STAR (Agency for Research, Science and Technology) Singapore. He met with A*STAR officials and scientists to better explore possible areas for mutually beneficial collaborative research. He also visited Abbott's R&D Centre, Singapore to promote the capability of the Riddet Institute.

A Food Structures Workshop was held in Palmerston North in February. Presenters included Professor Douglas Dalgliesh (University of Guelph), Professor Eric Dickinson (University of Leeds), Dr Dmitri Sokolov (Massey University), Associate Professor Kate McGrath (Victoria University of Wellington) and Professor Andy Rao (Cornell University).

What's on

The Institute's 'ProBioLife' technology has been selected for presentation in the prestigious 'IFT New Product and Technology' showcase event being held in June in the United States. Only products and technologies with great potential were selected for the showcase.

The Riddet Institute is holding two Food Innovation workshops in Asia in June in conjunction with New Zealand Trade & Enterprise. The one-day workshops are scheduled for 21 June (Singapore) and 23 June (Shanghai).

At the NZIFST conference in Rotorua on 29-30 June/1 July, the Riddet Institute will have a stand and a speaking slot.

The Riddet Institute Student Colloquium will take place from 4-6 July at the Sport & Rugby Institute in Palmerston North.

Professor Harjinder Singh is a keynote speaker at the ADSA conference in New Orleans from 10-14 July.

Professor Harjinder Singh is a keynote speaker at the International Whey Conference in Chicago from 13-14 September and at the NIZO conference in the Netherlands from 20-23 September.

"The History of Agri-food innovation in New Zealand", a new book from the Riddet Institute, will be launched on 29 September in Palmerston North.

Food Structures, Digestion and Health, a conference organised by the Riddet Institute, will take place in Palmerston North from 7-9 March.

New Position

Chair in Human Nutrition
Riddet Institute, Palmerston North, New Zealand

In conjunction with Fonterra Cooperative Group Ltd and the New Zealand Government's Primary Growth Partnership (PGP) in post-farm-gate dairy research, the Riddet Institute is seeking to appoint an outstanding individual to provide research leadership in human nutrition. The Riddet Institute is a partnership comprising New Zealand's leading food and nutrition research universities and Government research institutes. As a national Centre of Research Excellence, the Institute will lead this significant science programme for Fonterra and therefore this is a key role for establishing linkages with leading researchers and scholars across New Zealand and internationally.

You will have a demonstrable record of academic and/or industrial research leadership. Standing in all areas of nutritional science will be considered. Experience in the conduct of human metabolic, clinical or intervention studies would be an advantage.

Enquiries can be addressed to Co-Director of the Riddet Institute, Distinguished Professor Paul Moughan (P.J.Moughan@massey.ac.nz) or telephone +64 350 5284.

Riddet Institute
FOOD | INNOVATION | HEALTH