

## Innovation to Transform the Dairy Value Chain



### Dairy Primary Growth Partnership Programme

#### EXECUTIVE SUMMARY - 2012-13 Quarter 4 progress

The sub-programme is progressing well and continues to increase momentum as additional resources are incorporated into the programme. World-class science and technology is being developed, some of which are already being commercialised as new processes or products. Highlights this quarter are:

- Additional knowledge is being developed, that, if incorporated into proprietary cheese-making processes, will allow the ability to manufacture certain cheese varieties within one day, potentially enabling greater customisation to meet consumer needs (rather than the months using previous best-in-class technologies with limited ability to customise). Excellent progress is being made in understanding the way in which food structures can be changed and manipulated to act in new ways.
- The improved protein quality scoring method (research contributed as part of the PGP programme) called DIAAS, was published by FAO in early 2013. This resulted in a number of questions that need to be addressed before the full international adoption of the new method. The FAO are establishing an independent working group to determine what further research is required to enable full implementation of DIAAS. This method is more accurate and results in dairy protein quality measurements that are 10-30% higher than with the currently used method. This is significant for the entire food industry.
- A first generation system to detect and deter the commercial chemical adulteration of milk is in development and is undergoing commercial evaluation over the next 6 months.
- A prototype new approach to process control that could improve the quality of manufacturing processes has been developed and will be trialed at one of Fonterra's manufacturing sites this milk season.
- The programme intends to publish research findings, wherever possible, to facilitate international acceptance on new technologies. This quarter three papers have been accepted for publication with a further two papers submitted for publication during the period.
  - Holroyd SE, Prescott B, McLean A, "The use of in- and on-line near infrared spectroscopy for milk powder measurement" accepted for publication in the Journal of Near Infrared Spectroscopy on 19th June 2013.
  - Govindaraju R, Wu H, "Computer-aided Variables Sampling Inspection Plans for Compositional Proportions and Measurement Error Adjustment" submitted 24 July 2013 to The Journal of Computational Statistics and Data Analysis.
  - McGregor RM, Poppitt SD. *Milk protein for improved metabolic health: a review of the evidence*. Nutr & Metab 2013 Jul 3;10(1):46. [Epub ahead of print]
  - *Milk Proteins: From Expression to Food*, March 2013. McGregor RM, Poppitt SD. 'Milk proteins and human health', In Press 2013.
- 2 patents have been exemplified (this means the provision of data/trial results or other examples in the patent specification to illustrate that the invention works and that the claims are justified).

In keeping with the vision and goals for the sub-programme these outputs and the world-leading science and technology options have been created through an open innovation model that has significantly enhanced capabilities within NZ research providers and the quality and speed of scientific and technical solutions accessible to Fonterra and ZESPRI. This integration has created a critical mass of capabilities that will enable NZ to adopt global scientific leadership positions within the focus areas of the sub-programme and will be of broader benefit to the New Zealand food industry.

The programme currently supports 59 positions with several additional being recruited. One new Research Officer, one Post-doctoral research fellow and one PhD student joined the programme this period. One Masters was completed this period: ME (First Class Honours) in Chemical & Materials Engineering.

Total expenditure in the programme during the F13 year was \$6,047,624 of which industry contributed \$3,184,999 and MPI \$2,862,625.

#### Previous external publications

- Yang, SeoWon (2013). *Structure-Material Properties of Traditional Mozzarella*. Master of Engineering (Chemical and Materials Engineering) thesis, University of Auckland 2012 (submitted).
- Ma, X. (2012) *Evaluation of Functional Properties and Microstructure of Mozzarella Cheese, and their correlation*. PhD thesis, University of Auckland 2012 (submitted).
- Govindaraju R, Wu H, "A Tightened Single Sampling Variables Plan" accepted by the Journal of the Operational Research Society 12<sup>th</sup> January 2013.
- Govindaraju R, Wu H "On the efficacy of normalising transformation on variables acceptance sampling" submitted on 1<sup>st</sup> June 2012 to The Journal of Computational Statistics and Data Analysis.
- Holroyd SE, "The use of Near Infrared Spectroscopy on Milk and Milk Products" accepted for publication in the Journal of Near Infrared Spectroscopy on 15<sup>th</sup> March 2012.
- Hunter T, Presentation at International Forum for Process Analytical Chemistry "Fonterra and Dairy Process Analytical Technology" Baltimore January 2012.
- Govindaraju R, Wu H, "Single Sampling Inspection by Variables for Bounded Quality Characteristics Based on Beta Distributions" was submitted 20<sup>th</sup> September to The Journal of Computational Statistics and Data Analysis.
- Rong Zhang, Tamar Kadar, Ernest Sirimann, Alastair MacGibbon, Jian Guan. *Age-related memory decline is associated with vascular and microglial degeneration in aged rats*. Behavioural Brain Research 235 (2012) 210– 217. \*Rated as a top 10 publication in the area in the previous year.
- Zhang R, Kadara T, Sirimanne E, MacGibbon A, Guan J. *Age-related memory decline is associated with vascular and microglial degeneration in aged rats*. Behavioural Brain Research 235 (2012) 210-217. \*Rated as a top 10 publications in the area in the previous year.
- *Different digestibility measurements significantly impact the corrected amino acid scores of three dairy proteins*. Shane Rutherford, Aaron Fanning, Alison Darragh, Bruce Miller. IDF poster, November 2011.
- Guan J, MacGibbon A, Zhang RR, Elliffe DM, Moon S and Liu D. *Supplementation of dairy complex lipid concentrate (PGC80) improved the memory of aged rats*. Submitted to Neuroscience and Therapeutics.
- McGregor RM, Poppitt SD, Cameron-Smith D. *Biomarkers of sarcopaenia in older adults: focus on microRNA*. In preparation, submitted.
- *Different digestibility measurements significantly impact the corrected amino acid scores of three dairy proteins*. Shane Rutherford, Aaron Fanning, Alison Darragh, Bruce Miller. IDF poster, November 2011.
- Rutherford SM, Fanning AC, Miller BJ, Moughan PJ. *Dietary protein quality in humans – comparison of current (PDCAAS) and proposed (DIAAS) methods*. Submitted British Journal of Nutrition.