Transforming the Dairy Value Chain

Farming | Processing & Supply Chain | Ingredients & Dairy Solutions | Consumer Products

A Primary Growth Partnership Programme

Executive Summary

October – December 2014

Transforming the Dairy Value chain is a Primary Growth Partnership between DairyNZ, Fonterra and the Ministry for Primary Industries that seeks to enable a doubling in the value of dairy for NZ by 2025. The programme is now four years into the seven year term.

Dr Andrew Fletcher *(Fonterra)* has been appointed as overall manager for the programme. Andrew was previously managing the post-farm gate component of the programme *(Themes 3-5)* with a separate programme manager from DairyNZ for the on-farm component.

A mid-term progress review of the programme is now well underway with expert reviewers appointed and site visits underway. The final report is expected in May.

Theme 1: Innovation to create on-farm opportunities

The projects in this theme develop and implement technologies, identify opportunities, and improve information flow between industry participants, which allow dairy farmers to sustainably improve their dairy farm productivity.

Effective use of farm data is a core element of this theme. We are on a journey towards a more integrated approach to farm data management that is expected to reduce the data entry burden on farmers, whilst improving the quality of data available to inform decisions by a range of stakeholders.

In December the ***Dairy Core Database*** was transitioned from LIC to DairyNZ to form part of a new Dairy Industry Good Animal Database (DIGAD). DIGAD will hold all the data required for animal breeding evaluation purposes, and additional data for industry research. The transition of the information into industry-good stewardship is a step towards enhanced use of data to the benefit of industry as DIGAD now contains information about the entire national herd. Access to the core data will be allowed for industry-good purposes and is controlled by an independent panel.

Following from data standards agreed in Q1 the ***Land Application Data Standard*** has been agreed to support the interchange of information relating to the application of fertilizer and agrichemicals. The standard concerns both planned, and actual, applications of fertiliser, herbicide and pesticide. This will support interchange of data related to planning and ordering the application, or reporting on a completed application; details of the products applied, or to be applied; and spatial representations of the geographic features affected by the application. http://www.farmdatastandards.org.nz/

Supporting this is the ***Farm Data Code of Practice***, which defines disclosures and behaviours required of organisations storing, handling or moving data on behalf of farmers within the New Zealand agricultural industry. To date twenty-eight organisations have expressed interest in being accredited to the code and nine of these have started the accreditation process.

The implementation of an enhanced fertility breeding value has been delayed for one season to address additional technical questions for the NZ Animal Evaluation Ltd Board and improve fit with DIGAD. Breeding values are an important factor herd improvement that have multi-year consequences.

Theme 2: Capability and Capacity

This theme seeks to improve on-farm decisions through building industry capability, up-skilling rural professionals, developing supporting networks and attracting more people into the industry.

There has been a strong focus on environmental performance, and ensuring farmers have accredited experts they can turn to for advice. The benefits of this are now being realised. A report on the first year of operation of the ***Sustainable Dairying: Water Accord***[1] which demonstrates progress on key environmental actions was released in December. Significant effluent non-compliance is down to 7%, from 11.1% in 2011/12.

Work in the ***Train the Trainer programme*** supports delivery of several of the Sustainable Dairying: Water Accord targets.

- The *Audited Nutrient Management System* has provided for collection of farm data on nitrogen use efficiency and nitrogen loss.
- 78 rural professionals are now *Certified Nutrient Management Advisors*; *this includes more than 50% of Fertiliser Association of New Zealand member company nutrient management advisers. (*www.nmacertification.org.nz*)*.
- *Nine regionally-tailored riparian guidelines* have been developed in partnership with regional councils for Bay of Plenty, Canterbury, Greater Wellington, Manawatu-Wanganui, Northland, Otago, Waikato, West Coast and Southland regions.
- The Effluent Management programme has established consistent standards for farm effluent systems. *There are now over 500 professionals trained to help farmers achieve a fit for purpose effluent system.*
- 21 companies are *accredited for effluent system design*. *Dairy companies and regional councils are increasingly recommending accredited companies. A register of accredited companies is available on* http://effluentaccreditation.co.nz/accredited-companies/.
- The *Farm Dairy Effluent Warrant of Fitness* scheme is available as a tool for farmers to assess the suitability of their current effluent treatment systems. *This has been incorporated into some dairy companies' environmental management systems.*

The ***rearing of heifers*** off the milking platform is becoming common practise. The heifer rearing project aims to improve the standard of heifers entering the national herd by improving capability and heifer management skills. Pilot heifer rearing focus farms were established in Northland, King Country, Manawatu, and Otago. These held their first field days delivered in November and December 2014.

The events covered the importance of achieving heifer liveweight or growth targets, and relationship management between stock owners and graziers for improved milk production, reproduction and lifetime performance from the heifers. Farmers' feedback was that they

[1] http://www.dairyatwork.co.nz/land-water/sustainable-dairying-water-accord/

intend to develop more specific weight for age targets for their stock, increase the frequency of weighing and improve infrastructure to make weighing easier.

Theme 3: Creating & Managing Food Structures

The purpose of this theme is to provide an understanding of the relationship between the structure, material, and functional properties of dairy foods and how this can be managed through processing, in order to generate options for new product development. Options generated by the programme are commercialised through further industry investment outside the programme.

The team have made very good progress on solving technical challenges that will enable us to deliver what was a very ambitious process change target, while maintaining functionality, set at the outset of the mozzarella work. Having made some of the core science breakthroughs the focus is now on replicating the laboratory-scale science in a pilot scale process.

Outputs from studies into formulation, processing and seasonal effects in both whipping and culinary creams have provided insight into the levers responsible for product consistency and performance. This understanding has been captured and is being implemented by two existing product development projects. This knowledge has also led to a new product development project being initiated by Fonterra. The core technical challenge for creams remains balancing the apparently contradictory demands of stability to temperature cycling and whipping functionality.

Work on the structure and performance of microgels has produced exciting outputs that provide clues for the design of better tasting dairy products. We are planning to build capability at the Fonterra Research and Development Centre (FRDC) to exploit these outputs.

The ***kiwifruit structure*** work developed an initial mechanistic predictive firmness model for 'Hayward' green kiwifruit softening based on variable time-temperature input information and other currently-gathered data *(firmness, Brix, dry matter)*. This will be used with the temperature profiles measured in Zespri's global supply chains to estimated likely fruit outturns. The model, once validated, will further inform supply chain management decisions and ensure kiwifruit reaches the customer in the best possible state.

Theme 4: Processing & Food Quality Management

This theme is looking to create cost, performance, and efficiency gains in processing and food quality management and enable profitable growth in emerging dairy regions.

An increasing component of this theme is the ability to process large amounts of data and identify statistically significant patterns. This is the basis of the milk-fingerprinting approach where an enormous number of samples provide a statistical definition of normal milk against which "adulterated" samples appear different without needing to know in advance what adulterant has been used.

Ensuring a high quality supply of milk is critical to future growth. December saw initial deployment, outside the PGP Programme, of the first generation milk fingerprinting approach to the detection of commercial milk adulteration within one of Fonterra's off-shore milk pools.

The decision support tool has also been further refined and validated with routine data from NZ milk collection. Work is also progressing on potential second generation technologies: NMR and Raman spectroscopy.

Milk powder is, and will remain, a major component of the NZ product mix. The majority of milk powder is eventually consumed in a liquid format and the manner in which it dissolves is important to both consumers *– preparing a glass for immediate consumption –* and industrial customers who manufacture recombined UHT beverages. There are a large number of factors that influence this "functionality".

To enable manufacture of better powders the University of Auckland/Auckland University of Technology project team has been analysing process data from four Fonterra production sites, and aligning this with quality information on the resulting product. One of the challenges is objectively quantifying the results of laboratory test methods for functionality – many of which are based on visual assessment against standard images. The team are investigating the use of hyper-spectral imaging *(HSI)* to address this.

Theme 5: Robust Health & Wellness Benefits

This theme seeks to provide robust scientific evidence on the health and wellness benefits of dairy products for general nutrition, mobility and paediatric products.

The ability to rapidly and non-invasively assess body composition – and particularly muscle content – is important for both research and raising consumer awareness on mobility. The benefits of this have been demonstrated in Fonterra's successful relationship with GE Healthcare in Asia using heel scanners to provide consumers with information on their bone health. To extend this capability, an assessment of a range of tools for predicting body composition has provided good correlations between simple, non-invasive tools and the X-ray based methods typically favoured by researchers. This will enable these more convenient tools to be used for future research and consumer awareness activities.

Dairy protein is rich in essential amino acids and has an inherently high nutritional quality that is not fully recognised by the current international protein quality methods. A goal of this programme has been to provide data to support the introduction of a new method that recognises the full benefits of dairy and other animal sourced proteins. A paper on protein quality has been published in the Journal of Nutrition. The data reported in this publication will help to provide some of the information that the United Nations Food and Agriculture Organisation *(FAO)* requested to build a database before the new method can be fully implemented. The publication is also timely as the FAO protein quality expert workshop proceedings – which will shape the final protein quality research phase for adoption of the new method – has just been published.

New Publications and Capabilities

Publication of results has continued:

- 8 scientific papers accepted and a further 3 submitted
- 2 conference presentations or posters
- 4 webinars
- 7 industry standards / guides published

- 4 media releases

In addition 14 confidential project reports have been completed

Investment

Total ***expenditure in the programme*** during the second quarter of F15 was $6.0M of which industry contributed $3.2M and MPI $2.8M. In the Q1 the F15 forecast was lowered from $29.4M to $27.8M due to delays in finalising developing projects for the post farm gate themes. The F15 forecast at the end of Q2 is now $27.7M.