



Dairy Science & Technology

FOOD & TEXTILES GROUP

Section Manager: Dr Kerst Stelwagen

kerst.stelwagen@agresearch.co.nz
Direct Dial: +64 7 838 5180

Our focus is on adding value to the pastoral sector, before and after the farm gate, by:

- Optimising milk yields and high-value milk components for application on-farm.
- Discovering, isolating and characterising novel bio-actives from milk and other sources and partnering with industry to develop processes to turn these into high-value (food) ingredients
- Optimising operations on-farm and in-plant through novel non-invasive measurement applications.
- Investigating the complex interactions of foods in people, including food allergy and risk assessment of food components.

CAPABILITIES

Bovine Lactation Biology

Our research focuses on understanding how milk is synthesized and secreted and how the process of milk production can be optimized to increase the yield of milk and valuable components. Research covers all stages, from cell biology through to the whole animal by employing advanced genomic, bioinformatics, proteomic and epigenetic technologies. Practical applications of the research are in areas such as enhancing lactation persistency, mammary involution, once-daily milking, and novel approaches to managing mastitis.

Dr Kuljeet Singh
kuljeet.singh@agresearch.co.nz



AgResearch Ltd
Ruakura
Research Centre
Private Bag 3123
Hamilton 3240
New Zealand.
+64 7 856 2836

Mammary Innate Immunology and Bioactives

We are interested in the components of milk that contribute to host defence. In particular, we are investigating the role that the minor proteins in cow's milk play in recognition of pathogens and the subsequent stimulation of an immune response. The team is engaged in milk bioactive discovery through genomics, proteomics and bioinformatics. The team is characterising milk bioactives through protein purification and bioactivity testing and evaluating their commercial potential in close collaboration with industry partners. The work is aimed at developing novel bioactive ingredients for functional foods and nutraceuticals, through their antimicrobial, anti-inflammatory and immunostimulatory properties.

Dr Tom Wheeler
tom.wheeler@agresearch.co.nz



Milk is much more than a source for butter and cheese. It contains many constituents with health promoting and other bioactivities

Immune-Enhanced Milk

The team has developed proprietary technology to produce hyperimmune milk products for generic and therapeutic purposes. We have extensive experience with immunizing dairy cows, under both research and commercial conditions. We also have experience with immunization trials in sheep, chickens and small animals. We have capability in the analysis of milk immune components (growth factor and cytokine assays, cell culture, flow cytometry, protein analysis, and ELISA development) and are currently developing pre-clinical efficacy assays for testing the activity of milk bioactives.

Dr Liz Carpenter
liz.carpenter@agresearch.co.nz

Milk Allergy and Gut Health

Our research focuses on the immuno-modulatory properties of milk in areas of human health and well-being. A key focus is goat milk, which we have shown naturally contains bioactive components that are important for infant growth and development. Our current research is investigating food allergy, looking at the complex interactions between milk, the gastrointestinal tract and the immune system. This utilises our knowledge of protein chemistry, mucosal immunology and milk composition and our capabilities in immune-cell based assays, animal models of allergy and antibody-based analytical techniques.

Dr. Ali Hodgkinson

ali.hodgkinson@agresearch.co.nz

Dairy Product Development

This team bridges the gap between lab-bench science and commercial application, through industry-driven development and scale-up of food and nutraceutical products from dairy and other food sources. Products include bioactives and protein hydrolysates. The team also performs a range of underpinning technologies, such as protein chemistry, protein separations/chromatography, and speciality food analyses (fatty acid profiles, GC-MS, volatiles, degree of hydrolysis, protease activity, chromatography, PAGE).

Dr Derek Knighton

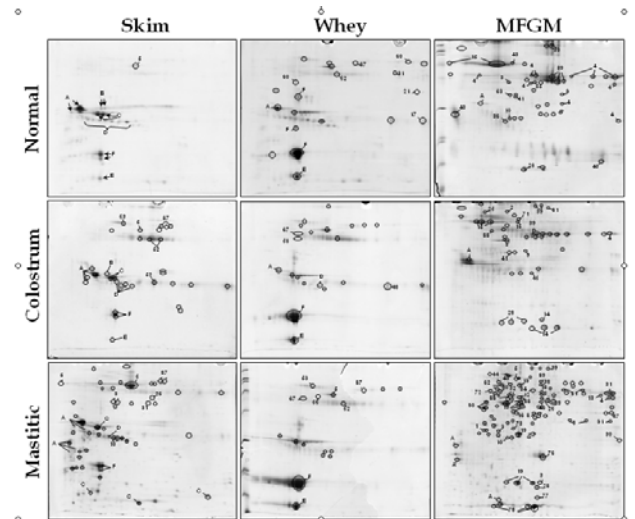
derek.knighton@agresearch.co.nz

Non-invasive Bio-Analysis

The team focuses on providing non-invasive measurement solutions based on methods covering the entire electromagnetic (X-ray, UV, Visual, NIR, Microwave) and acoustic (Ultrasound) spectra, complex image analyses, biosensors and volatiles detection through gas chromatography/mass spectrometry. It specializes in obtaining sample information (composition, quantity) without, or with minor, need for physical sampling (i.e. on-line) and extracting useful information with advanced data analyses (chemometrics). Moreover, the team has a track-record in designing and developing advanced measuring equipment. The team spans a wide range of fields, such as mastitis detection, meat quality, dairy product composition, biosecurity, and soil and pasture composition.

Shane Leath

shane.leath@agresearch.co.nz



Proteomics as a discovery tool for minor milk proteins

Toxicology

We work with a range of clients in the food area, evaluating the toxicity of chemicals and undertaking risk assessment of food contaminants. The team also has an interest in the identification and evaluation of food components that may be able to protect against cancer, particularly natural products that increase tissue activities of enzymes that detoxify cancer-causing chemicals. We have access to a wide range of cell lines for assessment of in vitro cytotoxicity.

Dr Rex Munday

rex.munday@agresearch.co.nz

Selected achievements

- ❖ Published the first proteome of minor milk proteins (Smolenski et al. 2007. *Characterisation of host defence proteins in milk using a proteomics approach. J. Proteome Res.* 6:207-15).
- ❖ Demonstrated that an extract of broccoli is able to protect against bladder cancer (Munday et al. 2008. *Inhibition of urinary bladder carcinogenesis by Broccoli Sprouts. Cancer Res.* 68:1593-1600).
- ❖ Identified key bovine mammary gene pathways (Singh et al. 2008. *CDNA microarray analysis reveals that antioxidant and immune genes are upregulated during involution in the bovine mammary gland. J. Dairy Sci.* 91:2236-46).
- ❖ Production of IgA-rich hyperimmune milk (Hodgkinson et al. 2007. *2007. Production from dairy cows of semi-commercial quantities of milk-protein concentrate containing efficacious anti-Candida albicans IgA antibodies. J. Dairy Res.* 74:269-75).
- ❖ Provided R&D under-pinning novel value-add dairy products (Lee et al. 2008. *Effect of Growth Protein-Colostrum Fraction on bone development in juvenile rats. Biosci. Biotechnol Biochem* 72: 1-6).
- ❖ Developed novel measurement technology (Reis et al. 2009. *Fast GC/MS and Chemometrics: exploring complex mixtures. Chem. New Zealand* 72: In press).