

## **What data can we get: The potential for omics in DairyCare**

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The rapidly developing technologies of proteomics and metabolomics are providing the most remarkable tools for biological analysis in a generation. The potential for these tools should provide the data on which an evidence-based approach for the care of dairy cows can be built. Proteomics provides the ability to separate, identify and measure most if not all of the proteins in a biological sample. In the case of the analysis of the proteins in bovine milk this has, over the last few years, dramatically increased the sensitivity of detection. Whereas the proteins in milk that could previously be detected were largely limited to those of high abundance such as the caseins,  $\beta$ -lactoglobulin and  $\alpha$ -lactalbumin with albumin and lactoferrin becoming more evident during mastitis, proteomic approaches based on chromatography and mass spectrometry can now detect several hundred proteins in milk. At the forefront of advanced proteomics are technologies that allow the simultaneous quantification of the proteins of milk reflecting disease related changes in the milk proteome. Thus, methods are being developed that can provide multiplexed and quantitative analysis of such disease associated protein including cytokines, antimicrobial peptides and acute phase proteins in milk samples during mastitis. In addition, focused approaches on the small peptides of milk can characterize the degradation products of caseins that occur during this disease and indicate that differing bacterial causes of the disease generate a differing pattern of casein fragmentation. Similarly, metabolomics is providing the ability to identify and detect change in the low molecular weight biochemical metabolites of biological samples to an extent not previously possible. Investigation of milk is only in its infancy using this technology, but it is likely that investigation of the milk metabolome dataset will be of great value in nutritional, physiological and disease related investigations. While proteomic and metabolomic investigations of dairy cows have largely focused on milk and blood there are great opportunities in the application of these 'omic technologies to generate data on the components of samples collected non-invasively such as saliva and sweat to improve the health and welfare of dairy cows.

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