

Genetics and genomics of energy balance measured in milk using mid-infrared spectroscopy

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A cow's energy balance is the differential between energy intake and energy output. Energy balance early post-calving is recognised to be both phenotypically and genetically related to both subsequent reproductive performance and animal health. Therefore having access to information on phenotypic energy balance and genetic merit for energy balance can be useful in improving cow reproduction and health. The measurement of true energy balance on many cows is not possible although proxies for energy balance (i.e. milk fat to protein ratio) have been suggested. To test if milk mid-infrared (MIR) spectroscopy could be used to predict energy balance across different production systems, 2,992 morning, 2,742 mid-day, and 2,989 evening milk MIR spectral records from 564 lactations on 337 Scottish cows managed in confinement on two diets. An additional 844 morning and 820 evening milk spectral records from 338 lactations on 244 Irish cows managed outdoors on grazed grass were also available. The accuracy of predicting energy balance varied from 0.47 to 0.69 across datasets. Significant genetic variation in predicted energy balance existed and genomic regions associated with differences in energy balance were also identified.