Estimation of forage quality on samples from the Pacific region using NIR calibrations based on a large worldwide database

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Since 2000, a collaborative research project sponsored by the Foss and DeLaval companies has led to the development of NIR calibrations for estimating forage quality. This project utilises NIR spectra and laboratory reference values from a large, amalgamated, worldwide database provided by scientists in research centres across three continents. The database consists of approximately 30,000 dried and ground forage samples representing many different forage species, products, environments and harvests across the world over a period of twenty years. The samples were scanned on several different Foss NIRSystems instruments including models 6250, 6500 and 5000. "Global" calibrations, i.e. calibrations that can be applied worldwide, were developed for dry matter (DM), crude protein (CP), neutral detergent fibre (NDF) and acid detergent fibre (ADF) using three different calibration methods – modified partial least squares (MPLS), "LOCAL" and artificial neural networks (ANN). Currently, these global models are being tested on separate, independent forage data sets from three different regions of the world and the results compared with locally developed calibrations based on local reference values.

This study focuses on the Pacific region, where six laboratories in Australia and New Zealand provided spectra from standardised NIR instruments and reference values on a total of approximately 1,000 diverse forage samples. These samples included forages such as tropical grasses which were not represented in the large global database. Results of the comparisons differed between laboratories and forage types, but in general the performance of the global models was either similar to or poorer than the locally developed models, which had been optimised for each local laboratory. As always, there appeared to be problems with some reference values, particularly DM. Slope and/or bias corrections to the global calibrations could be required before being applied locally. In some cases, the global models would clearly benefit from the addition of local samples. Identification of forage types that are under-represented in the database will allow improvements to the models by adding the appropriate samples. Efforts are also being directed towards the inclusion of digestibility in the global models, which, in ruminant nutrition, is an important parameter as an indicator of metabolisable energy.