## Abstract

# Progress and pitfalls in implementing NIR calibrations for feed grain quality across instruments

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## Introduction

Research efforts over several years in Australia have responded to demands from the grain and livestock industries for rapid, objective analytical tests to measure various quality criteria of grains at the point of delivery. NIR calibrations have been derived and are progressively being expanded, with commercial arrangements now in place to make them available. Meeting the expectation for seamless calibration transfer among various instrument types is a challenge.

## Materials and Methods

Calibrations have been developed on populations of approximately 200 samples, comprising various grain types, either whole or ground, for *in vivo* energy content measured using pigs, poultry and ruminants, as well as for several other components or properties. All calibration samples were scanned on laboratory-based grating monochromators, namely standardised Foss-NIRSystems models 6500, 5000 or XDS instruments. Calibration equations were transferred to similar standardised instruments, or alternatively the samples were re-scanned on instruments with different optical configurations, with new equations derived where equation transfer was impossible. Calibration equations have been installed on 21 instruments, and so far two ring tests have been conducted to compare NIR predictions. In both cases 10 samples covering five grain types (wheat, barley, triticale, sorghum and oats) were evaluated.

## Results and Discussion

As examples, current NIR calibration statistics (SECV, RPD, N) for MJ/kg apparent metabolisable energy (broilers), MJ/kg digestible energy (pigs) and MJ/kg DM estimated metabolisable energy (cattle) were 0.45, 2.7, 180; 0.27, 2.6, 170; and 0.34, 2.3, 96 respectively. Statistical analysis of ring test data is still in progress, but it appears that for broiler, pig and cattle energy predictions there are 4, 2 and 2 instruments respectively with unacceptable variation. Likely reasons for this are instrument differences, sample presentation method and effect of grain type, especially sorghum.

## Conclusion

Direct NIR calibrations on *in vivo* energy measurements can be effective, but challenges remain with size and structure of sample populations, maintaining calibration accuracy, and particularly in meeting industry demands for achieving acceptable agreement across grain species and NIR instruments of different types.

Reference paper as:
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Proceedings of the 15th International Conference on Near Infrared Spectroscopy,
Edited by M. Manley,C.M. McGoverin, D.B. Thomas and G. Downey, Cape Town, South Africa, p. 317.