

## Research Summary

# 4B-106 1112 - Quantification of variability in the amino acid and reactive lysine content of soybean meal and development of a NIR calibration for rapid prediction of reactive lysine content

## Principal Investigator

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## Background

Lysine in soybean is highly susceptible to heat damage during the oil extraction and significant amount of the lysine in soybean meal (SBM) is delivered in an unavailable heat damaged form. The level of heat damage is dependent on the amount of lysine and reducing sugars in the soybean as well as the degree and duration of heat treatment during the oil extraction process. The heat damaged and unavailable lysine cannot be discriminated from the bioavailable reactive lysine using the conventional total lysine analysis. Therefore, there is a need to establish reactive lysine analysis in an Australian laboratory and determine the variation in reactive lysine in SBM samples. Based on the collected data, the ultimate aim of this project was to develop a NIR calibration for accurate, rapid, and economic prediction for reactive lysine in SBM.

## Methodology

1. A reactive lysine assay has been successfully established and validated against results obtained from an external laboratory.
2. Sample collection: To collect a wide range of SBM, a total of 155 SBM samples from 31 shipments that originated from Brazil, Argentina, USA, and India were collected at Incheon Port, South Korea. A feed mill in China was liaised with and collected 24 SBM samples (3 weekly samples of 2 kg each from 8 SBM factories). A further 30 SBM samples (weekly aggregated samples for 30 weeks) were collected from a feed mill in WA (Wesfeeds, Welshpool, WA). From this protocol, a total of 209 samples were collected from a range of suppliers.
3. A NIR calibration for reactive lysine in SBM was established using a FOSS XDS NIR spectrophotometer.
4. An *in vitro* ileal digestibility study was conducted with range of heat treated SBM to establish regression equations for apparent, standardised and true ileal digestible reactive lysine content.

## Key Findings/Conclusions

1. Identified a 27% of variation in reactive lysine content across all samples (21.9 g - 30.1 g/kg as is basis) and 13% variation in within shipment samples, indicating the danger of spot-sampling to analyse reactive lysine content and emphasising a need for rapid prediction tool.
2. Prediction of reactive lysine from total lysine content was unreliable ( $R^2=0.52$ ).
3. Established a NIR calibration for reactive lysine prediction ( $R^2=0.86$ ).
4. Prediction includes apparent, standardised and true ileal digestible reactive lysine contents along with total reactive lysine content.

## Potential Users of Information (including value assessment)

SBM suppliers, nutritionists, feed manufacturers and pork producers