

## Final Project Summary

<b>Project title</b>	<b>The development of a digestibility coefficient database and the subsequent establishment of NIRS prediction equations for the digestibility of energy, protein and amino acids of rapeseed meal in pigs and broilers and an assessment of the safety of wheat DDGS with particular reference to mycotoxins and heavy metals</b>		
<b>Project number</b>	21130006	<b>Final Project Report</b>	PR582
<b>Start date</b>	April 2016	<b>End date</b>	March 2017
<b>AHDB Cereals &amp; Oilseeds funding</b>	£204,574	<b>Total cost</b>	£512, 984

### What was the challenge/demand for the work?

The UK feed industry is under pressure to reduce its reliance on imported soya bean meal as a protein source. Concerns over environmental impact, increasing price and the reduced availability of non-GM soya products have heightened the need to find viable alternatives to soya in feed formulations for pigs and poultry. While oilseed rape (OSR) is a high protein crop and regarded as a soya replacement, there are concerns that information about nutritional values and maximum inclusions rates for rapeseed meal (RSM) for pig and poultry require updating.

There is widespread belief amongst cereal growers that animal feed, along with biofuels, will be growing markets for their businesses. UK bioethanol plants using wheat feedstock are projected to produce around 1m tonnes of dried distillers' grains and solubles (DDGS) per year. At present, there is only limited information on the nature and levels of contaminants with DDGS and similar co-products.

### How did the project address this?

The project was completed under three work packages (WP). WP 1 and 2 were completed by AFBI and JHI and focussed on analysing the chemical and glucosinolate content of 92 samples of RSM, establishing a database of digestibility coefficients of RSM in pigs and broilers and developing NIRS to predict digestibility of RSM in pigs and broilers. WP 3 was completed by QUB and focussed on the safety of DDGS from the bioethanol, distilling and brewing industries and the impact of processing on mycotoxins, heavy metals and sulphur content.

### What outputs has the project delivered?

- There was wide variation in crude protein (CP), neutral detergent fibre (NDF), amino acid and glucosinolate content of RSM available for use in animal feed in the UK indicating the need for a means to accurately predict the nutritive value of RSM when offered to pigs and broilers.
- The four main glucosinolates isolated were progoitrin, gluconasturtiin, gluconapin and glucobrassicinapin.
- NIRS was found to accurately predict CP, NDF and lysine content of RSM and has the potential to predict the content of other amino acids.

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- Digestibility co-efficients (apparent ileal digestibility (AID), standardised ileal digestibility (SID) and total tract) were also highly variable with variation in some parameters over 70%. This highlights the requirement for an alternative to average “book” values within formulation packages.
- A large database of digestibility values (AID, SID and total tract) for RSM has been established based on 92 RSM samples. NIRS has the potential to predict AID and SID of some amino acids (particularly lysine in pigs and threonine in broilers) with ratio to prediction (RPD) values being greater than >1.5.
- Future work should focus on those particular amino acids where NIRS prediction of digestibility resulted in RPD values of greater than 1.5. These NIRS prediction equations could be further developed by increasing the dataset.
- Measured basal endogenous losses were successfully determined and were in line with published values which will provide a useful basis for future research on different feed ingredients.
- A method was developed on the UHPLC-MS for 77 different mycotoxins and other fungal metabolites.
- DDGS analysed were found to contain 13-34 different mycotoxins per sample. Future work should focus on the additive or synergistic effects of the mycotoxins identified.
- Elemental analysis of the DDGS was also to ascertain low and high elevations of essential and toxic elements.

### Who will benefit from this project and why?

- OSR breeders and producers. NIRS equations to predict chemical composition can be used in the development of breeding programmes.
- Pig and broiler industries. NIRS prediction equations can be used to predict digestibility and thus result in more accurate ration formulation.
- Importers of animal feed ingredients and compound feed producers. The results found will help to indicate the safety and nutritional levels within DDGS used in animal feed.

### If the challenge has not been specifically met, state why and how this could be overcome

<b>Lead partner</b>	Agri-Food and Biosciences Institute
<b>Scientific partners</b>	The Queen’s University of Belfast and The James Hutton Institute
<b>Industry partners</b>	ABVista, Cargill, Aunir
<b>Government sponsor</b>	DAERA (Northern Ireland)

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