2014/15 Harvest Grain Sample Analysis

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and

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FGP - 2014/15 Harvest Grain Sample Analysis

1.0 Key Observations

- 2014/15 grain samples provided available energy results consistent with previous AusScan testing data and the reference samples.
- Samples from NSW contained higher levels of screenings and lower test weight where screenings were high. Similarly barley samples from NSW as well as Vic and SA had higher screening levels.
- Protein content was highly variable, with dry growing conditions providing many high protein grains.
- Starch content was found to have no correlation with available energy for either pigs, broilers or cattle.
- Wheat with high screenings, assuming the grain is adequately milled, provided available energy values equivalent to samples with low screenings.
- Tasmanian wheat was generally lower in Pig DE and Broiler AME. These samples were higher in insoluble NSP and arabinoxylan.
- A potential wheat segregation based on total starch and protein using the Tasmanian wheat samples demonstrates the potential value that could be achieved using grain analysis technology.

2.0 Overview of Sample Collection and Testing

A total of 132 wheat and 42 barley samples were collected from across Australia. Emphasis was placed on collection of more variable samples seen through higher screenings content as well as samples from Tasmanian production regions. All samples were from grain harvested from the 2014/15 growing season.

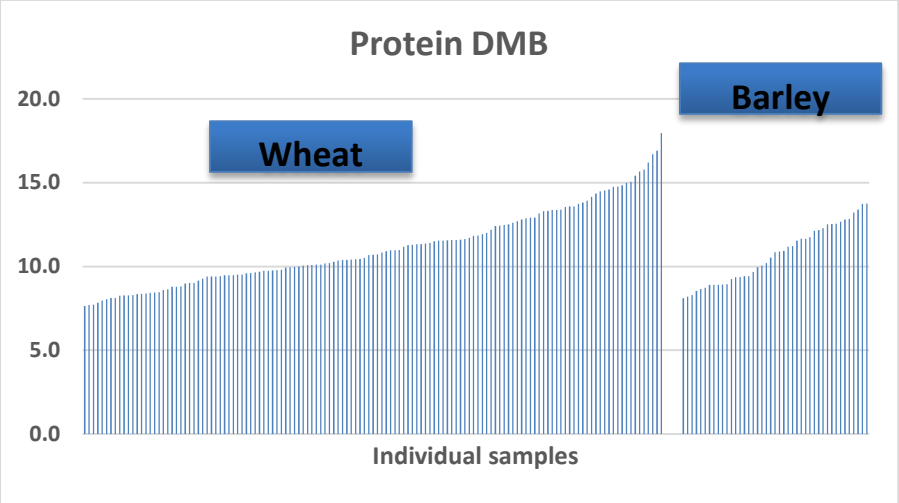
NSW Department of Primary Industries at Wagga Wagga completed the AusScan analysis on the samples collected.

Acknowledgment is provided to representatives from Grainflow, CBH, Broadbents Lakaput and TAP AgriCO for their support in providing access to their 2014/15 harvest grain samples.

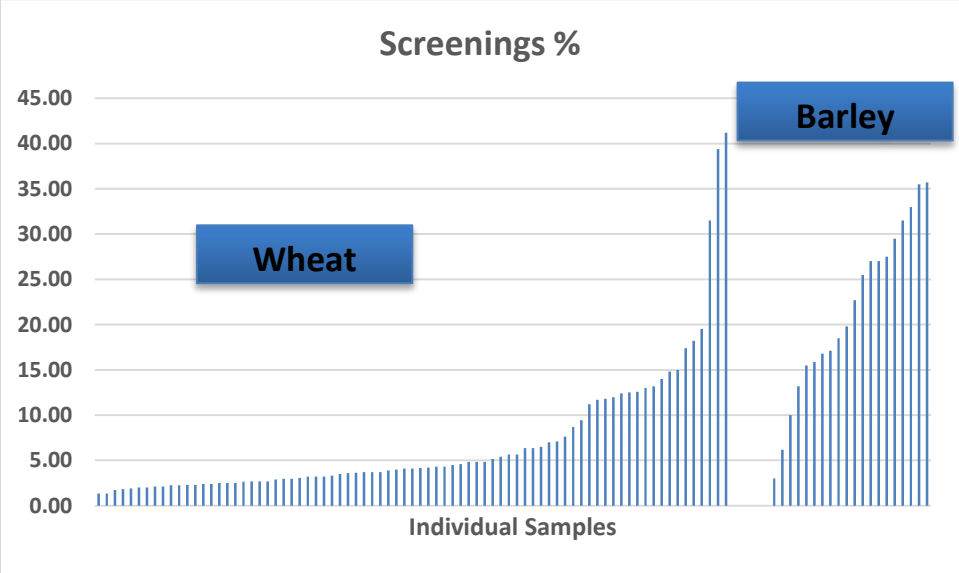
3.0 Results and Discussion

The following figures provide data for the main AusScan results. Some of the samples were provided with test weight and screenings data that has been used in the discussion below. Within each figure, each column provides individual sample results.

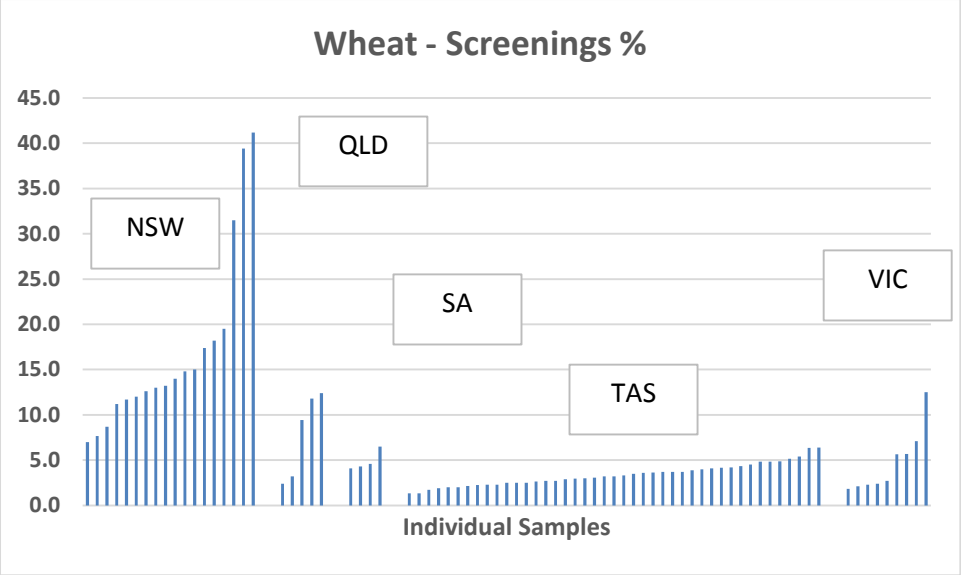
Protein, Screenings & Test Weight



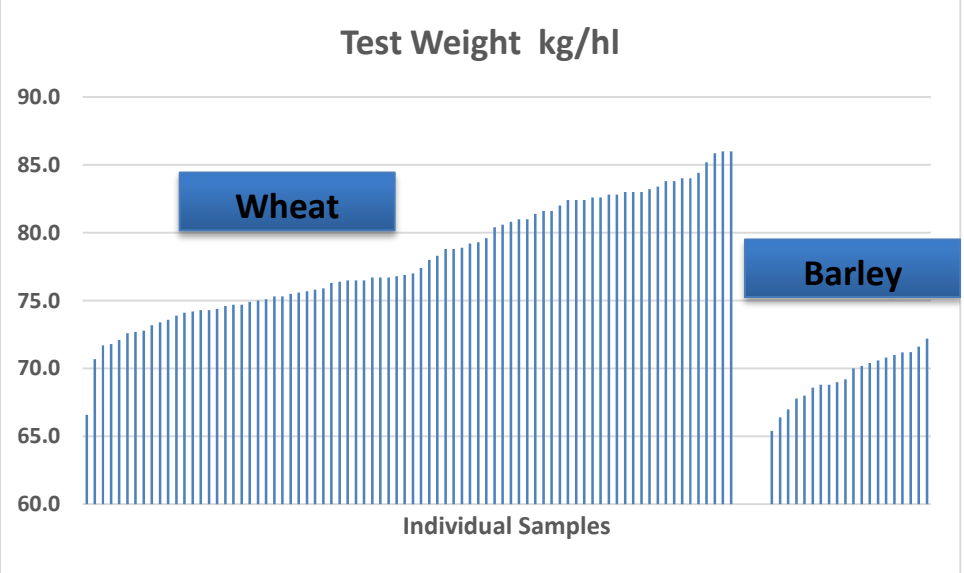
The 2014/15 harvest has provided a large spread in wheat and barley protein results. The seasonal conditions in many regions resulted in a dry finish with a greater portion of the crop being smaller in grain size, exhibiting greater screenings and protein levels.



Splitting samples between states identifies the effect dry growing conditions had across NSW with some feed grain wheat samples including high levels of screenings. With barley there were also considerable screenings in grain samples sourced from Vic and SA in addition to NSW.

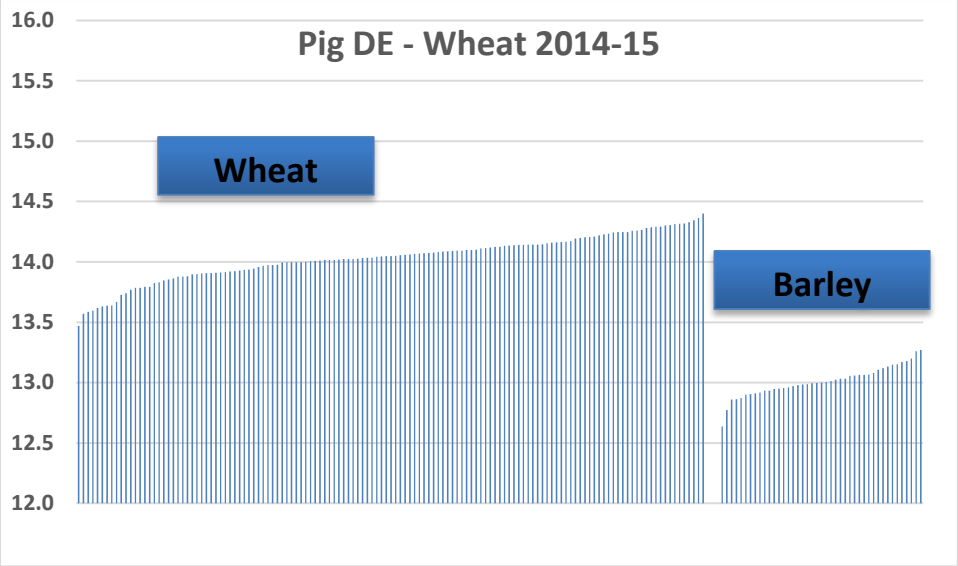


There is an expected large range in test weight results for both wheat and barley samples. Based on GTA standards of ASW and FED1 being minimum 76 and 62kh/hl respectively, a considerable volume of wheat would have been downgraded to feed classification. Surprisingly the barley test weights meet minimum malt standard at a minimum 65kg/hl. However as seen above, high screenings and protein will have resulted in significant quantities of barley being downgrading to feed quality.

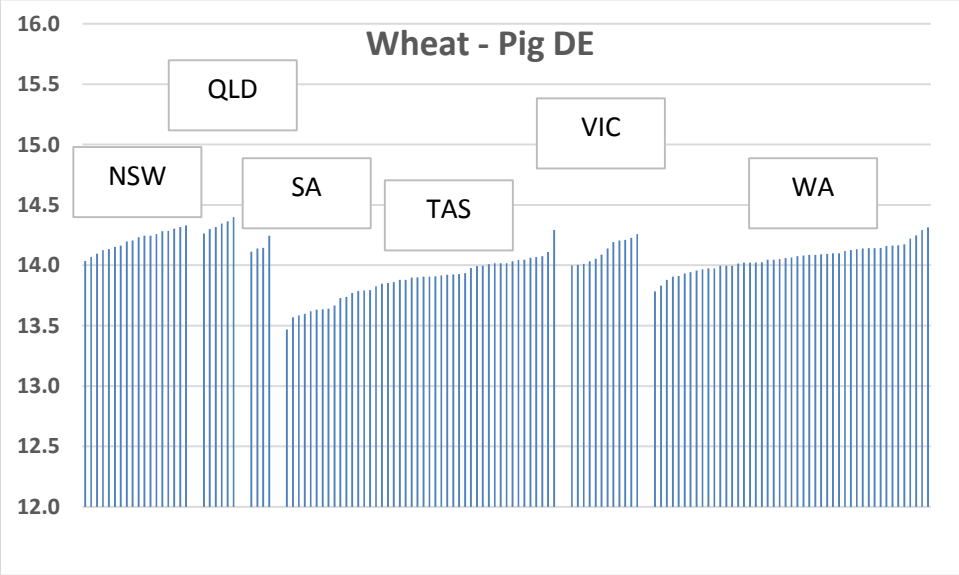


Pig Faecal DE

The amount of variation in Pig DE is less than expected in BOTH wheat or barley when considering the number of high screenings grains included within the sample set. The range of results is in the middle of the PGLP database used to generate AusScan NIR calibrations.

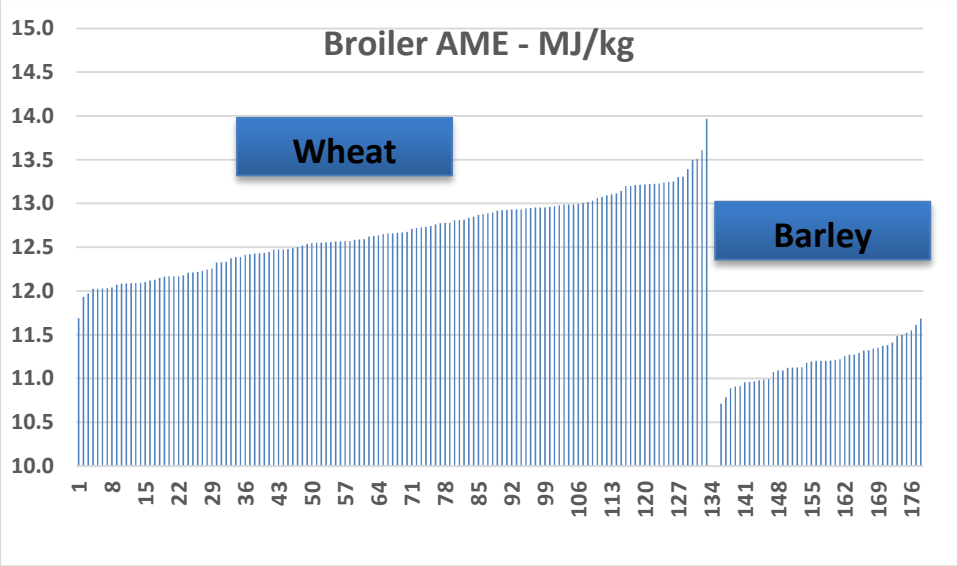


Viewing the results split between states, there is seen to be lower Pig DE results for the Tasmanian grain samples. NSW provides some of the higher pig DE results even though the grains contained higher screenings.

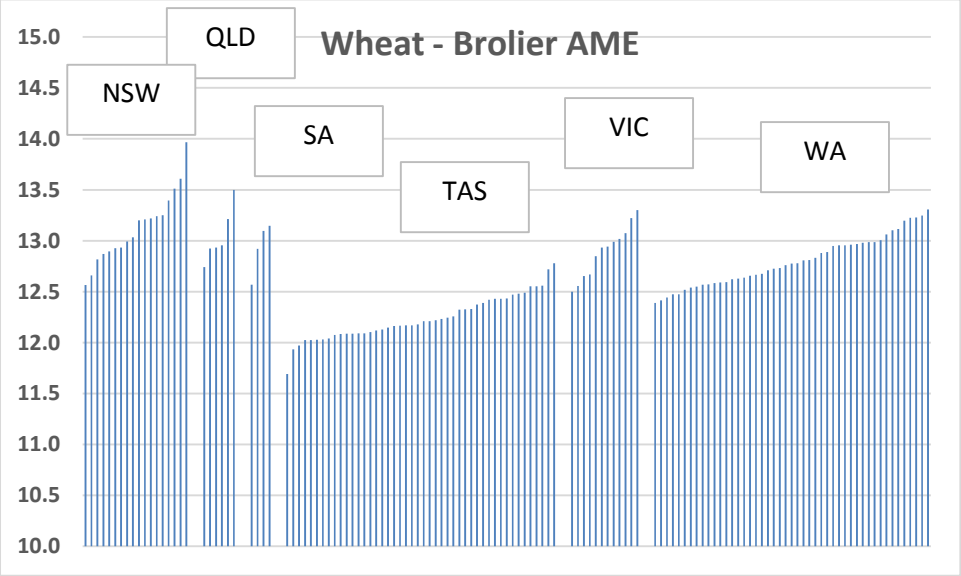


Broiler AME

There is a 2MJ/kg range in wheat AME values, barley samples provided less variation. Considerable variation occurred with samples supplied from Tasmania.

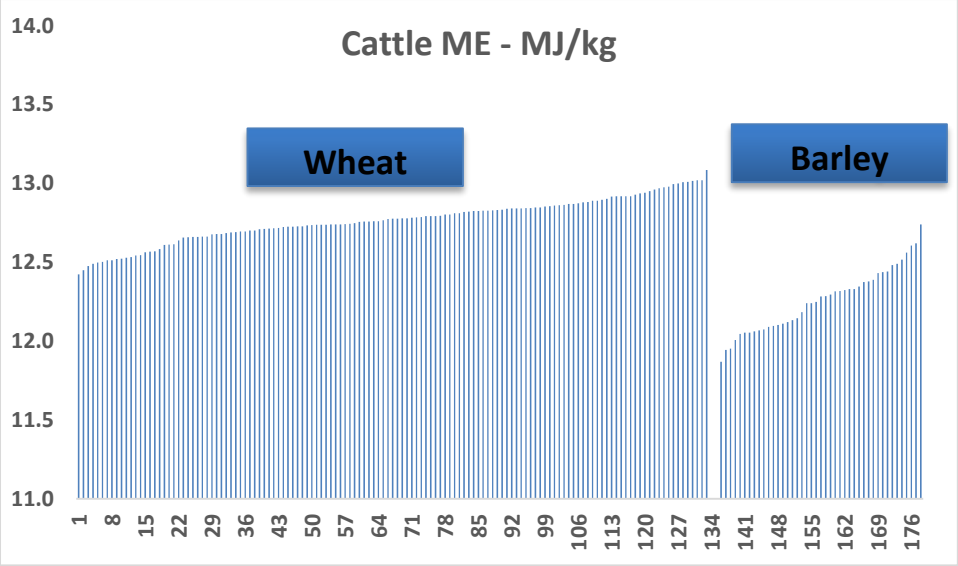


As with Pig DE, the Tasmanian grain samples provided lower broiler AME than other states. NSW and Qld provided some of the highest broiler AME results.

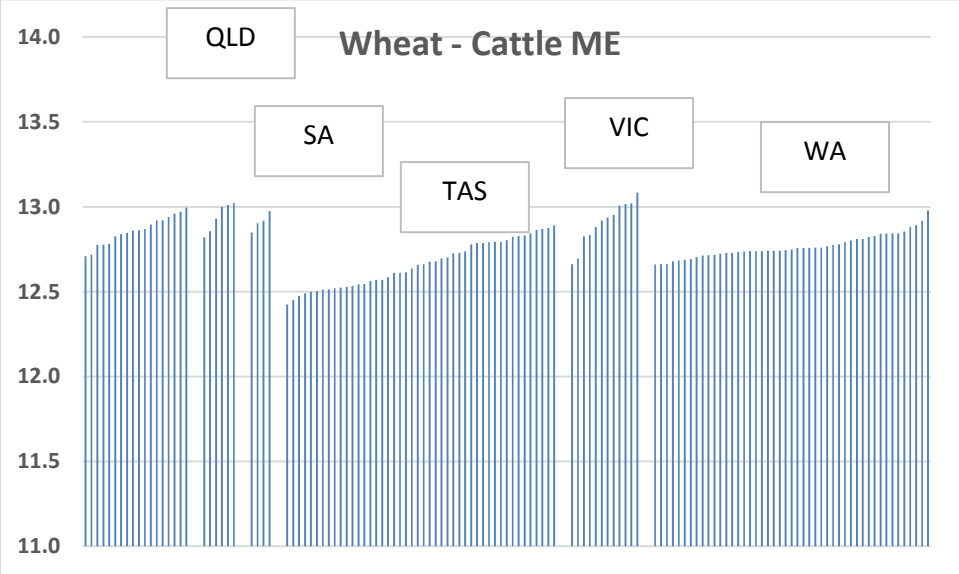


Cattle ME

The range in Cattle ME is less than 1MJ/kg and consistent with previous data generated using the AusScan NIR calibrations.

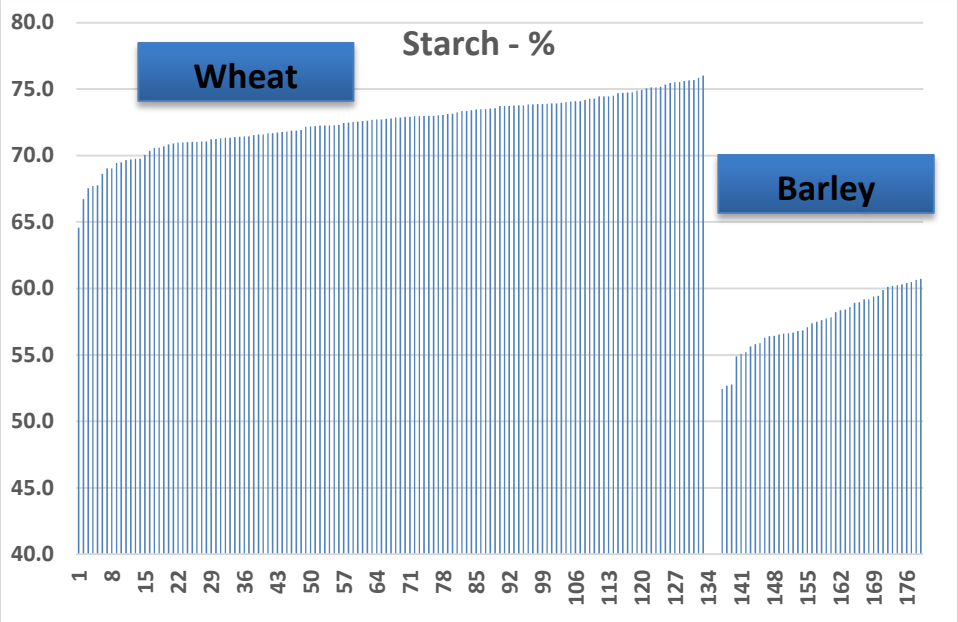


With cattle ME it is seen that the Tasmanian wheat samples do not differ greatly from other states, this being different to use within pigs and broilers.



Total Starch

Starch content in wheat varied + OR - 5% and barley by + OR – 4.5%. For wheat samples containing high screenings, there was a trend for declining starch and increasing fibre content as screenings increased.



Utilisation of High screenings wheat and barley

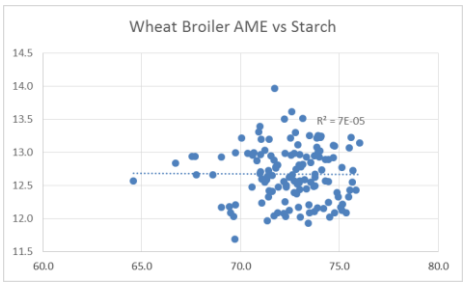
The PGLP research based on in vivo feeding of pigs, broilers and cattle demonstrated that neither test weight or screenings were strongly correlated with available energy content of grains. It is only the extreme high level of screenings or low test weight grains that are seen to be lower in available energy. The proviso on this statement is however that the grain is required to be adequately milled, with the PGLP research being based on hammer milled grains for pigs and broilers and dry rolled grains for cattle. **Where small grains are present, should the grain not be inadequately milled prior to feeding, smaller light weight grains may present more variable animal performance.** The table below identifies the PGLP findings in the major grain characteristcis correlated with available energy.

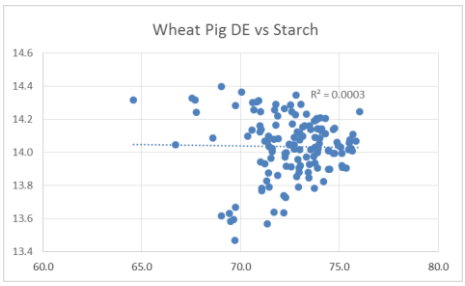
Grain characteristics correlated with increasing available energy content

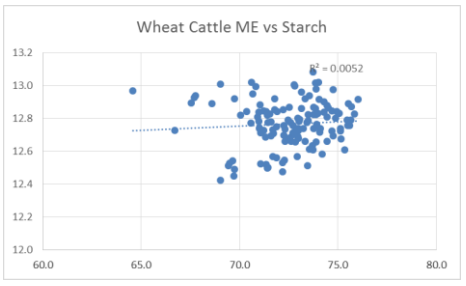
Pig & Poultry	Ruminants
Thin, fragile endosperm walls	Thick, intact endosperm cell walls
Low arabinoxylan & ß-glucan content	High arabinoxylan content
Low whole grain viscosity – for poultry	High whole grain viscosity
Soft grains, high water holding capacity	Hard grains
Low hull content	Low fibre & hull content
	Low acidosis index (slower fermentation rate)

Test weight or grain size or screenings NOT well correlated with available energy
Starch and protein are not correlated with available energy

Using the wheat samples from the 2014/15 harvest, the following figures demonstrate the lack of any correlation between available energy and total starch in wheat for pigs, broilers and cattle.

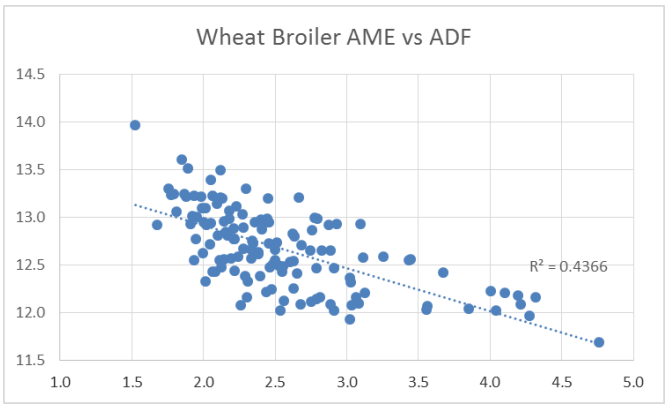


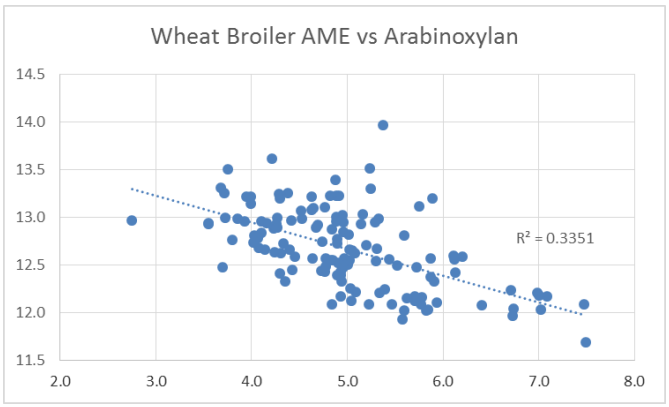


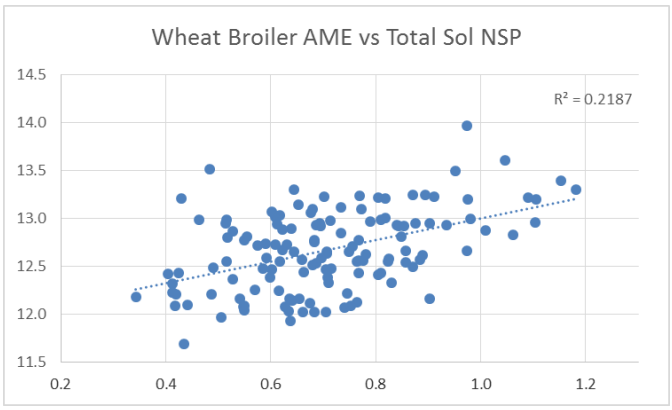


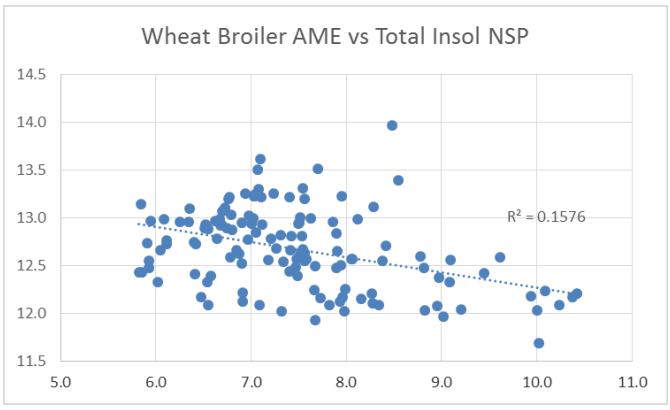
Using the AusScan results, the characteristics of wheat that are correlated with available energy are shown below. Additional characteristics of having thin fragile endosperm cell walls and soft grain with a high water holding capacity for pigs and broilers are not provided via the AusScan NIR calibrations. Similarly for ruminants, hard grains with intact endosperm cell walls are correlated with higher available energy. However the benefit of NIR is to provide an available energy prediction based on the grain spectra relative to the in vivo test reference samples.

Broiler AME

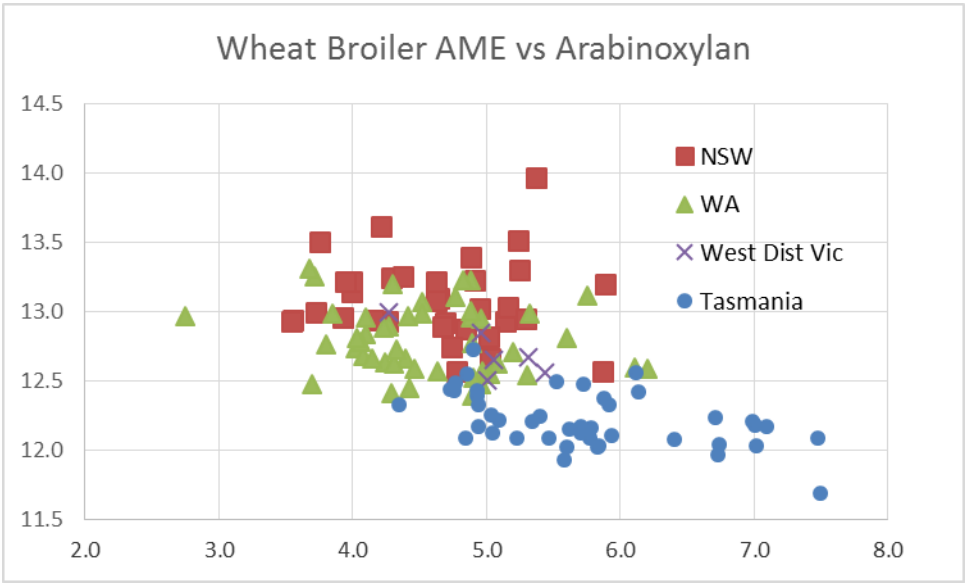






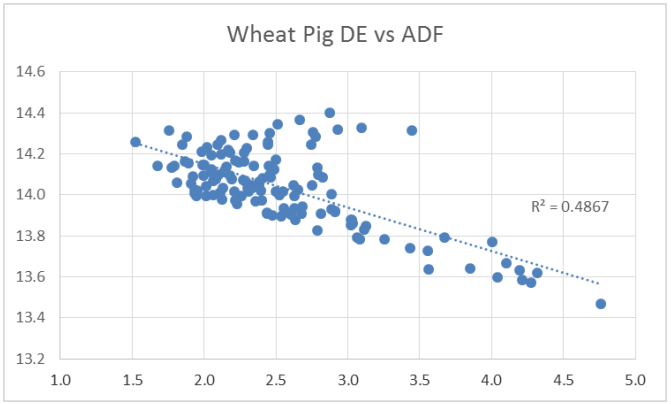


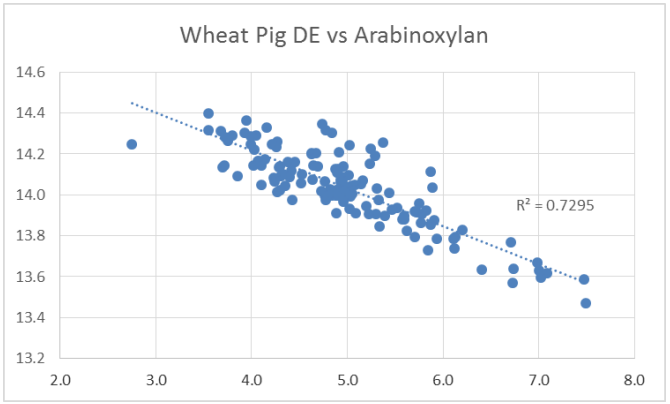
Splitting out by state, it is seen that wheat grown in 2014/15 in Tasmania has higher levels of arabinoxylan and lower broiler AME. NSW wheat although higher in screenings from a dry finish remains higher in AME.

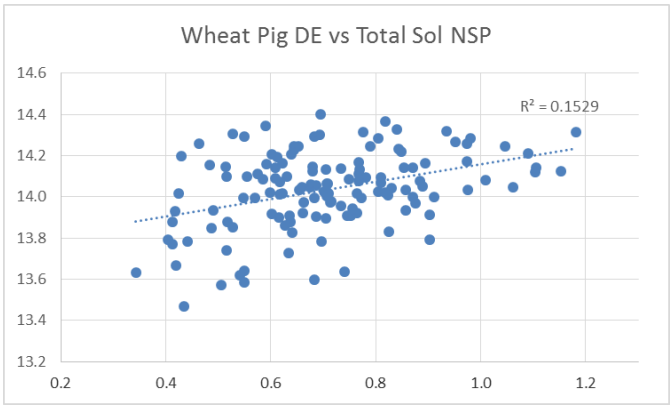


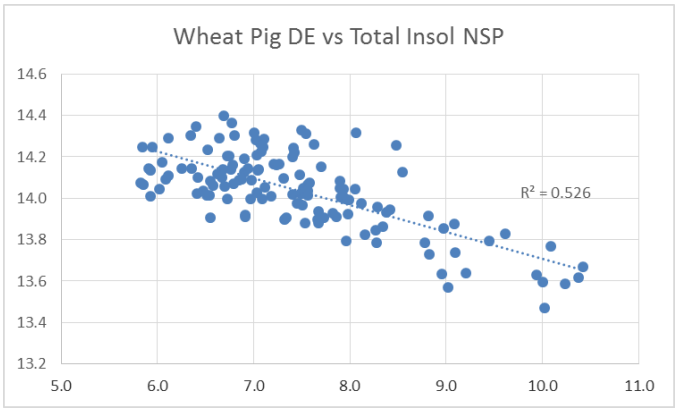
Pig DE

The correlation between AusScan results and Pig DE for wheat are shown in the following figures.



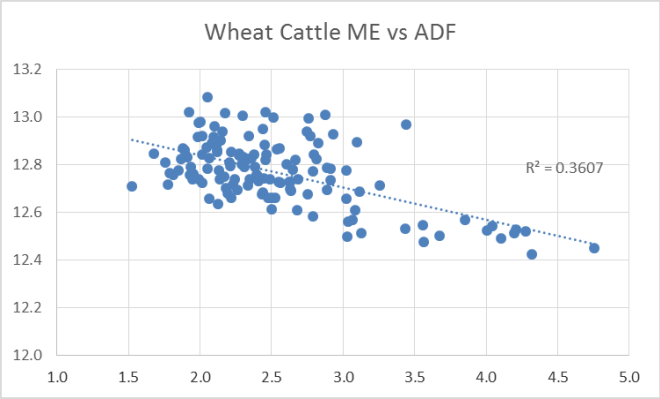


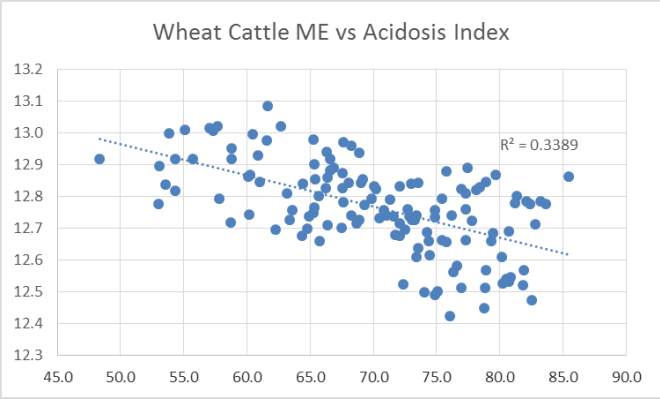




Cattle ME

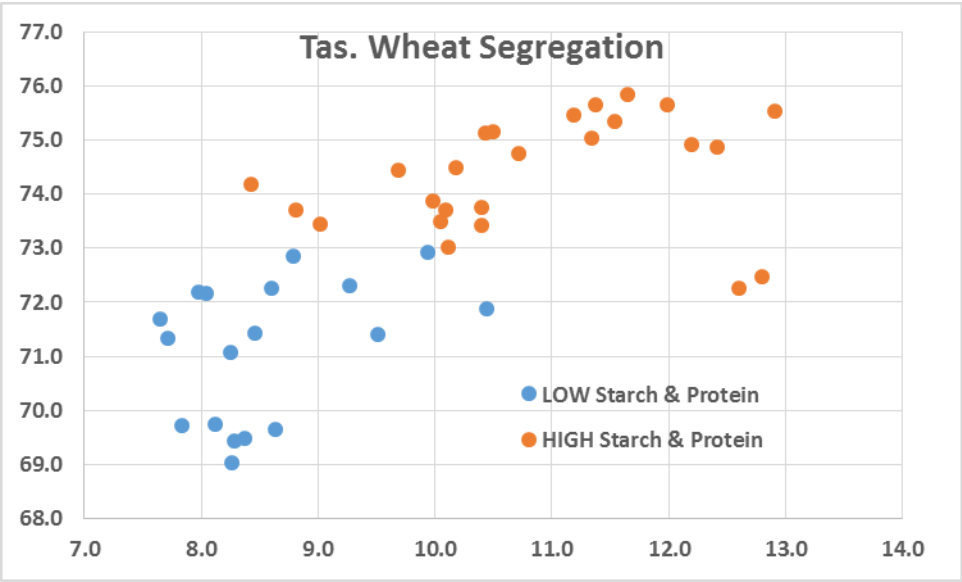
Within AusScan there is a basic calibration for acidosis index that provides an indication of how rapidly the grain ferments and releases volatile fatty acids and lactic acid. Although this calibration is limited in the number of samples it includes, the results provide a far greater correlation with Cattle ME than screenings level or test weight. Fibre content is also more closely correlated with Cattle ME.





Tasmanian Wheat Samples and Potential Segregation

This is the second year the FPG has tested Tasmanian wheat samples, with this being used to assess whether AusScan test results can be used to segregate grain for supply to the dairy industry. The figure below identifies wheat samples that have been segregated based on protein and starch. This could be achieved in practice using AusScan NIR starch analysis and on site protein testing. The justification for using starch is due to the dairy industry and ruminant nutritionists call for grains higher in starch, even though starch is not well correlated with the grains ME content! To date, only a small part of the dairy industry has embraced use of the AusScan Cattle ME results.



Assuming the segregated grains were consolidated into one average grain lot, the nutrient content of the grains would be:

Segregation Summary

	HIGH Starch & Protein	LOW Starch & Protein
Starch - %	74.4	71.1
Protein - %	10.8	8.6
Cattle ME - MJ/kg	12.8	12.5
Test Weight - kg/hl	76.3	73.9

The average difference between the two segregations is 3% units starch. Whether there is sufficient value to justify the cost of segregation would depend on the end users and price they are willing to pay. Based on 3% extra in 71% starch = 3/71 = 4.2% extra starch in the grain. If the cost of wheat is $300/tonne = $12.60/tonne added value simply looking at starch content. This added value needs to be balanced against additional costs to segregate the grain.