2015/16 Harvest Grain Sample Analysis

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FGP - 2015/16 Harvest Grain Sample Analysis

1.0 Key Observations

- 144 wheat and 63 barley samples obtained from NVT test sites were analysed using the AusScan NIR technology.
- 2015/16 grain samples provided available energy results consistent with previous AusScan testing data and the prior two years NVT sourced test results.
- Samples from parts of NSW, Vic and SA contained high levels of screenings, this being more apparent in barley.
- Protein content was highly variable, with dry growing conditions providing many high protein grains.
- Wheat and barley with high screenings, assuming the grain is adequately milled, provided available energy values equivalent to samples with low screenings.
- These test results are expected to be more consistent due to accessing composite samples from NVT sites. There is greater consistency of soil types, fertilizer application, agronomy and crossing conditions than experienced under commercial conditions.
- The results support the use of AusScan by the supply chain participants to better define grain quality. Data generated from using AusScan allows end users to better understand grain quality and the value of this grain in animal feeds.

2.0 Overview of Sample Collection and Testing

The Feed Grain Partnership has for the third year completed grain testing using the AusScan NIR technology to assess grain quality. A total of 144 wheat and 63 barley samples were collected from across Australia. All samples were from grain harvested from the 2015/16 growing season. Samples were largely obtained from National Variety Trial (NVT) sites.

NSW Department of Primary Industries at Wagga Wagga completed NIR scans on the samples collected and AusScan calibrations, via Aunir's on line AusScan service, were used to predict grain quality. For a number of samples test weight and screenings were also provided using grain quality data collected by NVT service providers.

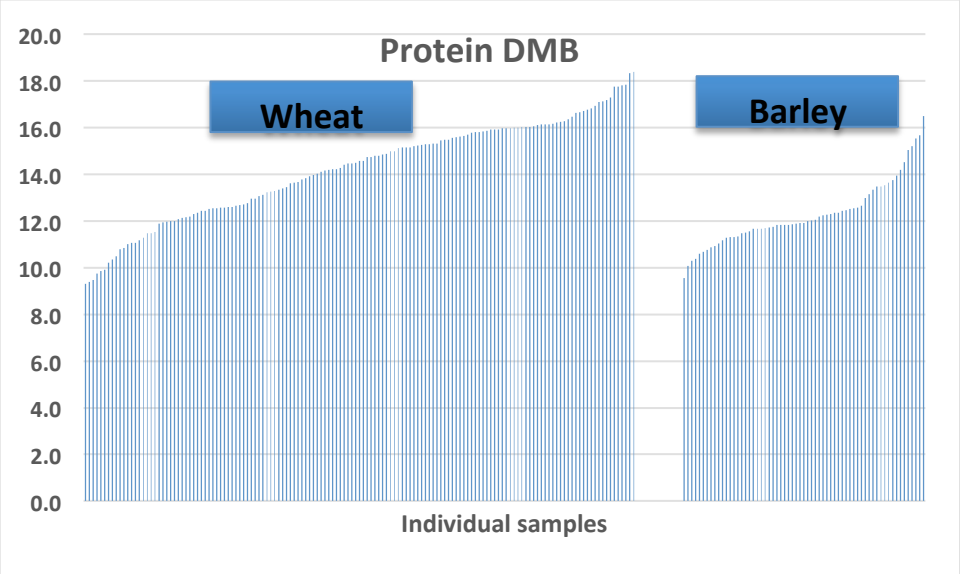
Acknowledgment is provided to representatives from Roy Latta D&M, Kalyx, Eurofins WA, WWAI, DPI Qld, PIRSA and TAP Agrico for their support in providing access to their 2015/16 harvest grain samples.

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, columns provide individual sample results.

Protein, Screenings & Test Weight

The 2015/16 harvest grains have provided an extremely large range of protein results, with both wheat and barley average protein exceeding the previous two years results.

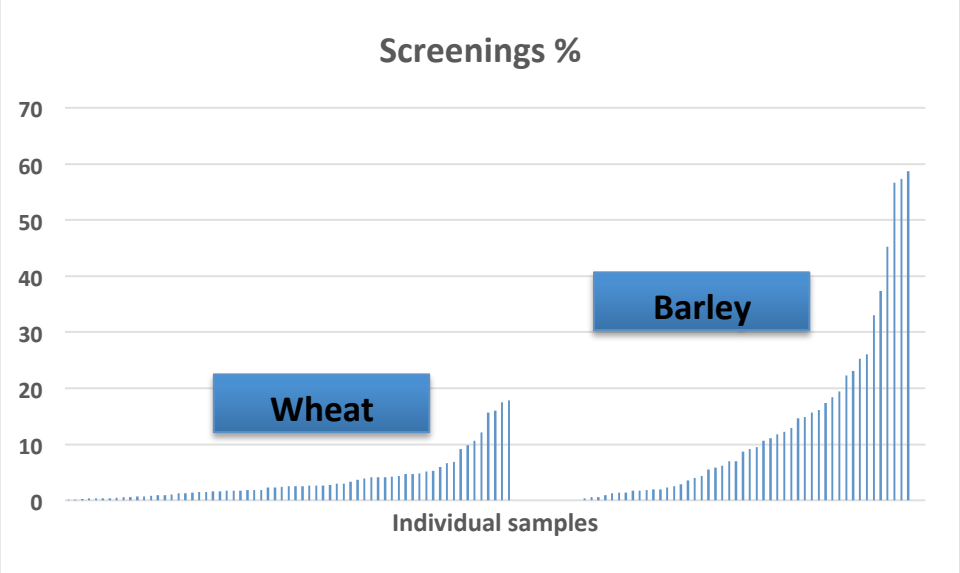


Barley had a considerably lower average test weight. The summary below compares against the previous two year's test results.

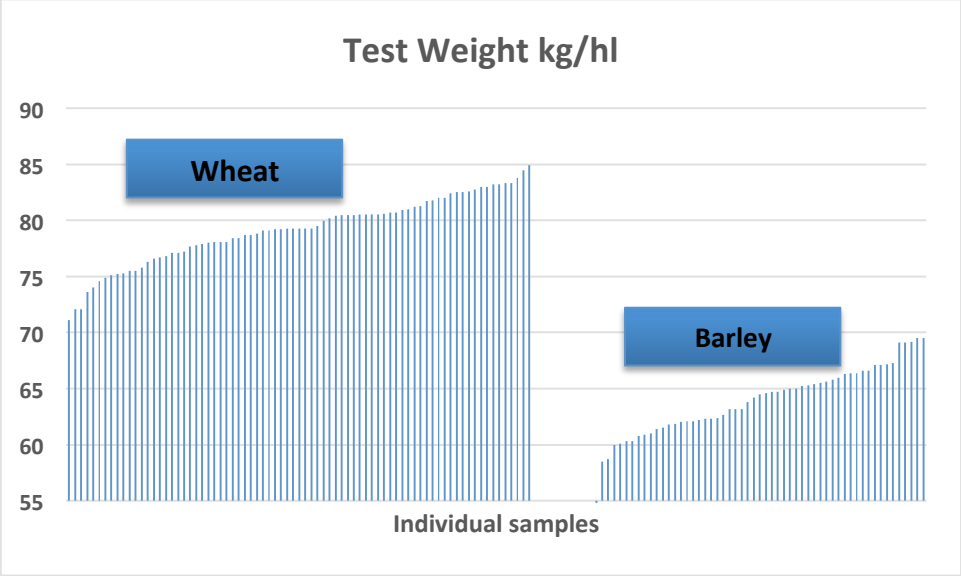
	2015/16	2014/15	2013/14
Protein % Dry Matter Basis			
Wheat			
Min	9.3	7.4	7.8
Mean	**14.2**	**10.0**	**10.6**
Max	18.4	15.0	16.9
Barley			
Min	9.5	9.3	7.5
Mean	**12.3**	**11.6**	**9.4**
Max	16.5	13.8	11.5
Test Weight kg/hl			
Wheat			
Min	71.1	66.6	68.0
Mean	**79.2**	**78.2**	**81.0**

Max	84.9	86.0	86.0
Barley			
Min	58.5	65.4	65.0
Mean	**64.1**	**69.6**	**69.0**
Max	69.5	72.4	73.0
Screenings %			
Wheat			
Min	0.1	1.3	0.9
Mean	**3.8**	**7.0**	**2.8**
Max	17.9	41.2	17.6
Barley			
Min	0.39	3.0	2.4
Mean	**13.7**	**21.5**	**5.3**
Max	58.7	35.7	17.1

The following figure demonstrates the extremely large portion of barley grown within NVT sites that had excessive levels of screenings. This mirrors commercial crops with a large volume of high screenings barley entering the feed market from the 2015/16 harvest. Dry seasonal conditions had a marked impact on barley quality and to a lesser extent wheat quality.

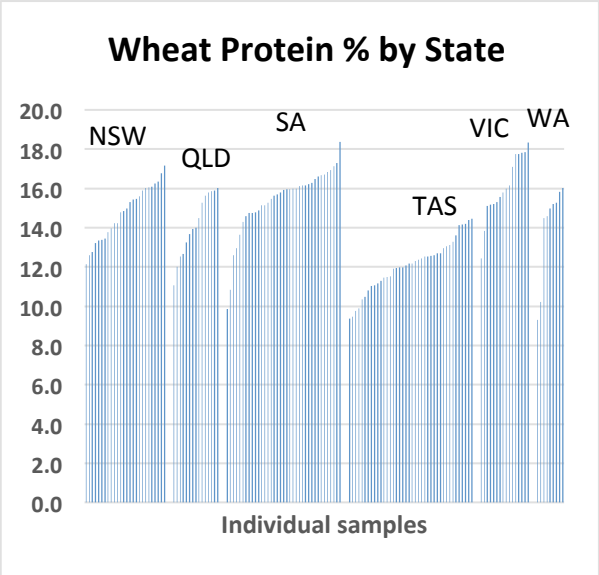


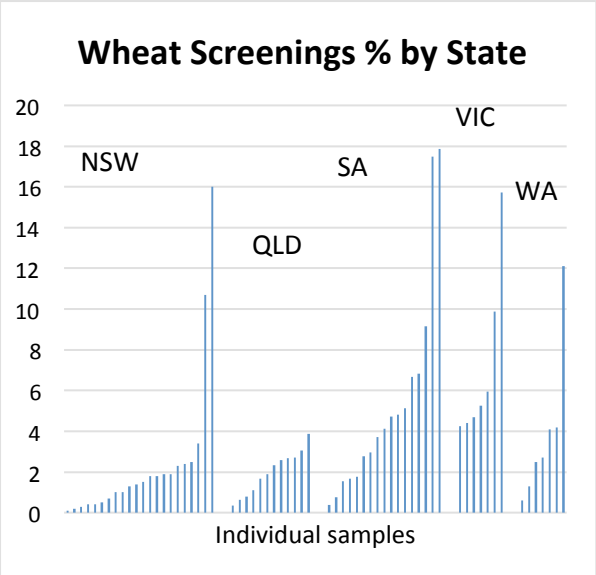
Grain test weight was highly variable and based on GTA 2015/16 receival standards of 76 kg/hl for ASW wheat and 62.5 kg/hl for Feed 1 Barley; 17% of wheat and 37% of barley samples tested were below these standards.



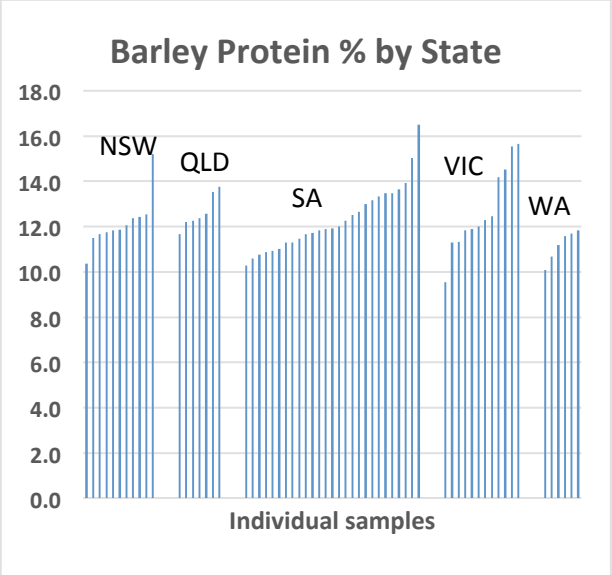
State Differences

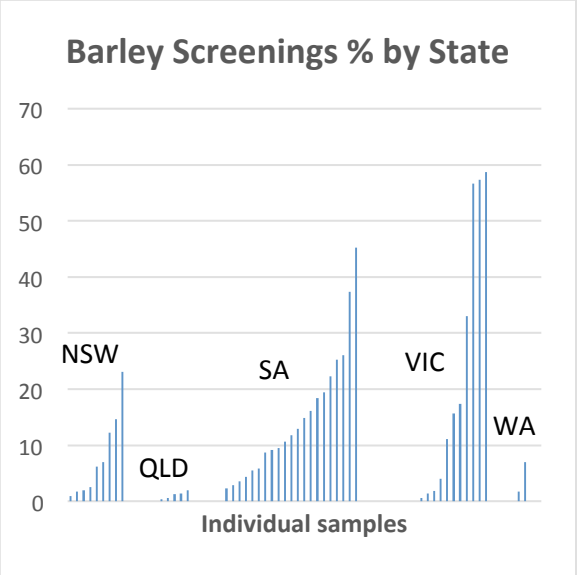
Splitting samples between states identifies the effect dry growing conditions with Victoria, SA and some NSW samples providing higher protein wheat results. Tasmanian samples were lower protein than other states, although still higher than average. No screenings data was available for the Tasmanian samples. The high screenings samples came from NSW, Vic and SA NVT sites that experienced lower rainfall conditions.





The barley results are seen to be more extreme than wheat in terms of the impact of growing conditions in SA, Vic and NSW. It can be seen that a large portion of SA and Vic barley samples were greater than 15% screenings, the maximum limit for Feed 1 Barley.





Results for AusScan predictions for each state for 2015/16 is shown in the following tables. No barley samples from Tasmania were available.

WHEAT	Moisture (%)	Fat (DM) (%)	Protein (DM) (%)	Crude Fibre (DM) (%)	Ash (DM) (%)	Starch (DM) (%)	Free Sugars (DM) (%)	NDF (DM) (%)	ADF (DM) (%)
NSW	10.1	1.5	14.8	2.3	1.4	70.7	1.3	12.6	2.4
QLD	10.7	1.6	14.1	2.2	1.4	72.4	1.1	11.8	2.6
SA	9.7	1.4	15.4	2.1	1.4	70.7	1.4	12.7	2.1
TAS	10.4	1.8	12.1	2.4	1.4	72.2	1.2	12.3	3.2
VIC	9.8	1.5	16.1	2.2	1.5	69.9	1.3	13.0	2.4
WA	10.1	1.6	14.0	2.2	1.4	72.1	1.2	11.9	2.5
All Samples	10.1	1.6	14.2	2.3	1.4	71.3	1.3	12.4	2.5
Std Dev	0.61	0.32	2.13	0.34	0.06	1.50	0.14	0.98	0.68

BARLEY	Moisture (%)	Fat (DM) (%)	Protein (DM) (%)	Crude Fibre (DM) (%)	Ash (DM) (%)	Starch (DM) (%)	Free Sugars (DM) (%)	NDF (DM) (%)	ADF (DM) (%)
NSW	9.2	2.8	11.9	5.5	2.4	55.9	1.4	23.4	7.1
QLD	9.3	2.4	13.0	5.9	2.4	55.9	1.4	23.4	7.0
SA	8.2	2.7	12.3	6.0	2.4	55.9	1.3	23.4	7.4
VIC	8.5	2.4	11.9	6.0	2.4	55.6	1.5	23.4	7.0
WA	8.5	2.5	12.4	5.7	2.4	56.1	1.4	23.0	7.2
All Samples	8.6	2.6	12.3	5.8	2.4	56.0	1.4	23.3	7.2
Std Dev	0.63	0.37	1.40	0.44	0.08	2.35	0.33	1.33	0.61

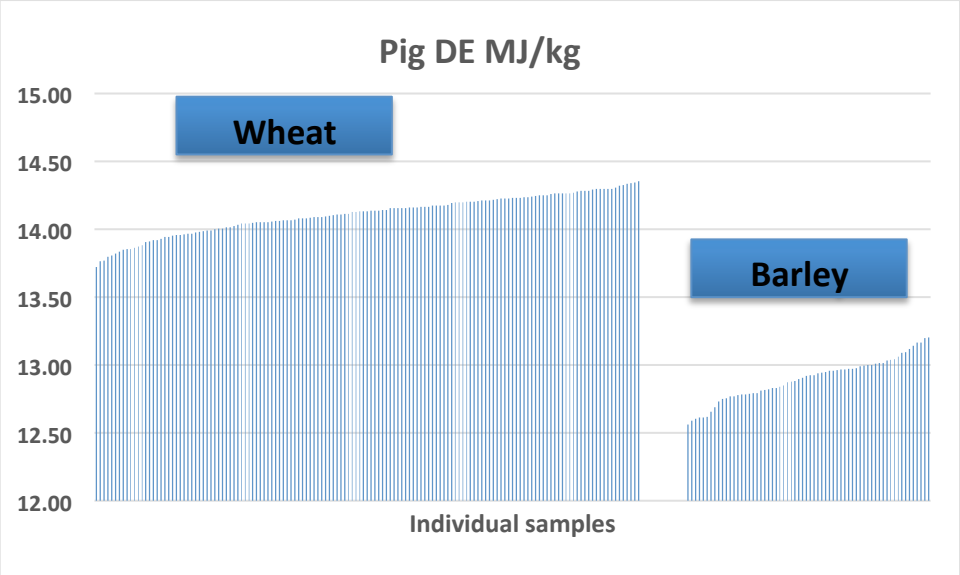
WHEAT	Broiler AME (as is) (MJ/kg)	Pig Faecal DE (as is) (MJ/kg)	Pig Ileal DE (as is) (MJ/kg)	Cattle Estimated ME (DM) (MJ/kg)
NSW	12.3	14.1	12.3	12.6
QLD	12.5	14.1	12.4	12.6
SA	12.2	14.2	12.3	12.6
TAS	12.8	14.0	12.3	12.6
VIC	12.3	14.2	12.2	12.6
WA	12.5	14.2	12.4	12.6
All Samples	**12.4**	**14.1**	**12.3**	**12.6**
Std Dev	0.31	0.14	0.13	0.03

BARLEY	Broiler AME (as is) (MJ/kg)	Pig Faecal DE (as is) (MJ/kg)	Pig Ileal DE (as is) (MJ/kg)	Cattle Estimated ME (DM) (MJ/kg)
NSW	11.6	13.0	10.4	12.1
QLD	11.8	12.8	10.3	12.1
SA	11.2	12.9	10.2	12.2
VIC	11.4	12.8	10.3	12.3
WA	11.6	12.9	10.3	12.2
All Samples	**11.4**	**12.9**	**10.3**	**12.2**
Std Dev	0.38	0.16	0.17	0.10

Pig Faecal DE

The AusScan Pig DE predictions show a small amount of variation for both wheat and barley, this is even though there are extreme differences in seasonal growing conditions across Australia. When data is compared across the last three years, the mean result is within 0.1MJ/kg and the range from lowest to highest Pig DE is less than 1MJ/kg.

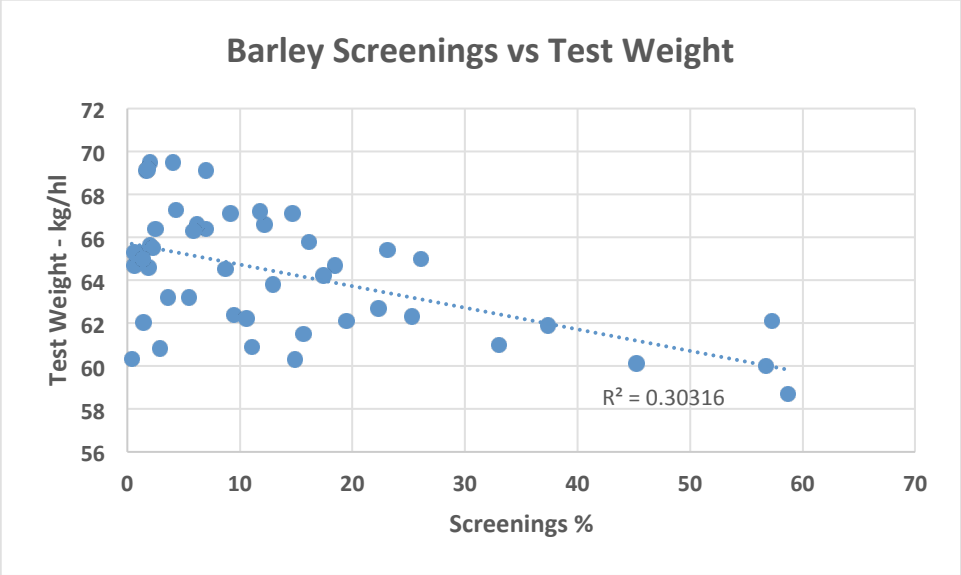
While these samples derived from NVT trial sites indicate there is limited variation in Pig DE between grain samples, for commercial grain supplies there is likely to be more variability. The NVT trial sites provide higher consistency in soil types, fertilizer application and growing conditions than is experienced across all regions and farms used in Australian grain production. The variability of results was further reduced through the testing of composite site samples provided from NVT test sites.

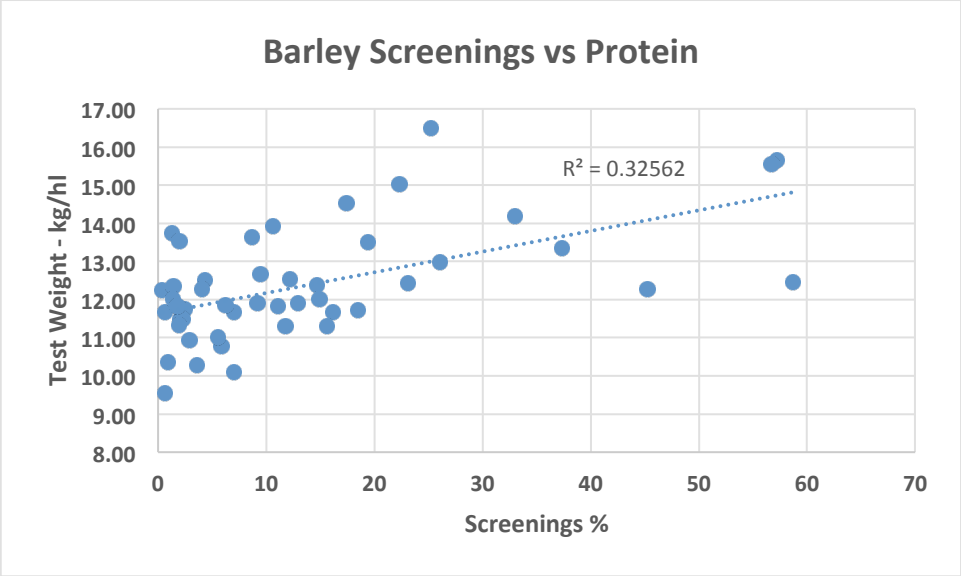


	2015/16	2014/15	2013/14
Pig DE MJ/kg as fed			
Wheat			
Min	13.7	13.5	13.2
Mean	**14.1**	**14.0**	**14.0**
Max	14.4	14.4	14.4
Barley			
Min	12.6	12.6	12.7
Mean	**12.9**	**13.0**	**12.9**
Max	13.2	13.3	13.1

Barley Screenings and Test Weight Impact on Available Energy

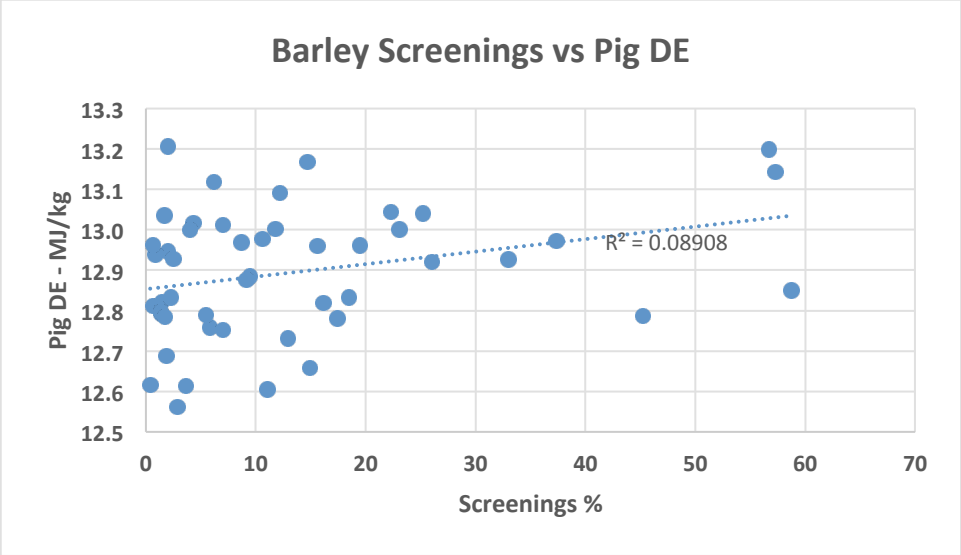
The figures below provides the relationship for barley between test weight and screenings as well as protein and screenings. Growing conditions resulting in higher screenings in barley is generally seen as grains lower in test weight and higher in protein.

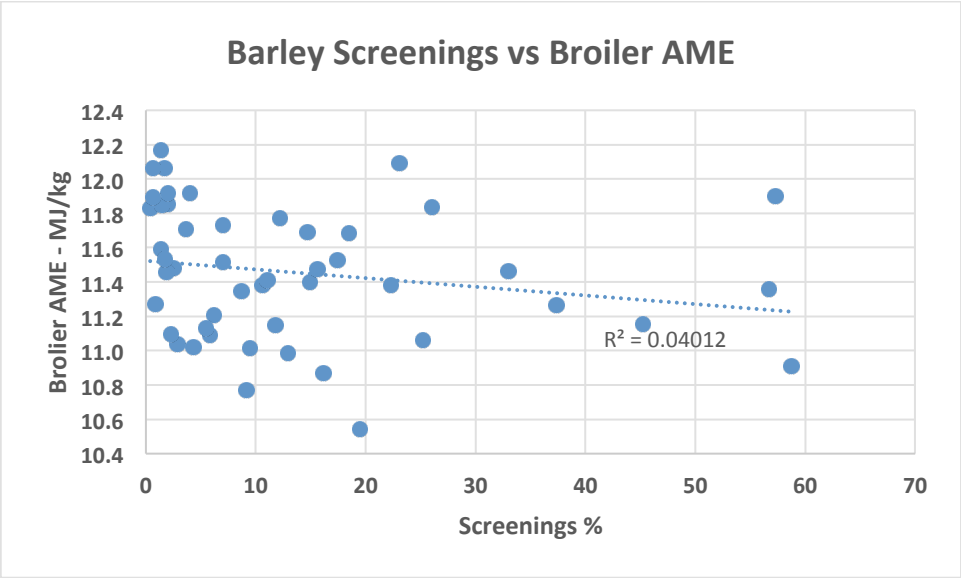


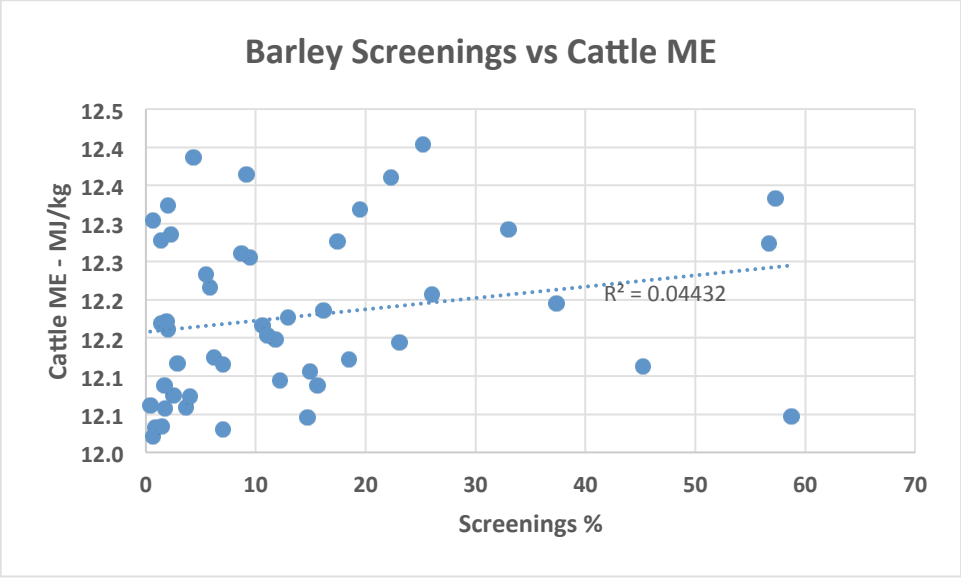


The traditional view has been that high screenings and low test weight results in grain that is lower in available energy. The work undertaken by the Premium Grains for Livestock Project (PGLP) using in vivo feeding of broilers, pigs, cattle and sheep did not support this view. PGLP demonstrated that other characteristics of grain have a far greater impact on available energy than screenings or test weight.

Access to barley samples containing up to 50% screenings from the NVT trials sites has provided an opportunity to compare screenings against available energy NIR predictions. It can be seen that for broilers, pigs and cattle there is no relationship between screenings and available energy content for barley.


Barley Screenings vs Pig DE
Pig DE - MJ/kg
13.3
13.2
13.1
13.0
12.9
12.8
12.7
12.6
12.5
R² = 0.08908
0
10
20
30
40
50
60
70
Screenings %


Barley Screenings vs Broiler AME
Brolier AME - MJ/kg
12.4
12.2
12.0
11.8
11.6
11.4
11.2
11.0
10.8
10.6
10.4
R² = 0.04012
0
10
20
30
40
50
60
70
Screenings %


Barley Screenings vs Cattle ME
Cattle ME - MJ/kg
12.5
12.4
12.4
12.3
12.3
12.2
12.2
12.1
12.1
12.0
R² = 0.04432
0
10
20
30
40
50
60
70
Screenings %

Note of Caution: The AusScan calibrations are based on *in vivo* feeding research, where grains were milled under research controlled conditions. This included hammer milling for pigs and poultry and dry rolling for cattle. Under commercial conditions, there maybe limitations in milling capacity and a greater chance of small whole grains passing into finished feeds. Under these conditions, grain containing higher screenings may result in lower available energy levels.