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Interpretation of statistical data

The results of replicated trials are presented as either the predicted or average (mean) for each of the replicates within a treatment. When analysing data statistically, authors generally use a REML spatial model or ANOVA, respectively.

In this document we provide an example of ANOVA, in which the means of more than one treatment are compared to each other. The least significant difference (LSD P≤0.05), sometimes seen at the bottom of data tables gives an indication of the treatment difference that could occur by chance. Not significant (NS) indicates that there is no difference between the treatments. The size of the LSD can be used to compare treatment results and values must differ by more than this value for the difference to be statistically significant.

At a 95% confidence interval (p-value ≤0.05) we are 95% confident that observed differences in a trial are due to the treatments, and not by chance (5%).

Interpretation of replicated results: an example only

Below we use an example of a replicated wheat variety trial containing both grain yield and quality data (Table 1). Statistically significant differences were found between varieties for both grain yield and protein. The LSD for grain yield of 0.40 means there must be more than 0.40 t/ha difference between yields before that variety's performance is significantly different to another. In this example Calibre is significantly different to all other varieties as it is the only variety followed by a superscript ([a]). Scepter, Vixen and Ballista are not significantly different from each other and are all followed by a superscript ([b]) as they all yielded within 0.4 t/ha of each other.

Similarly, for grain protein, variety performance was only significant from another if there was more than 0.9% difference in protein. In the example, Catapult contained a higher protein level compared to all other varieties which were not different to one another.

Where there are no significant differences between treatments, NS will be displayed as seen in the screenings column below (Table 1).

Table 1. Wheat variety grain yield, protein and screenings from a hypothetical example to illustrate interpretation of p-value and LSD (P≤0.05). Columns with shaded values show the best performing treatments.

Variety	Grain yield (t/ha)	Protein (%)	Screenings (%)
Catapult[b]	3.50[c]	10.3[a]	0.2
Ballista[b]	3.98[b]	8.4[b]	1.0
Vixen[b]	3.75[bc]	9.1[b]	0.5
Scepter[b]	4.05[b]	8.9[b]	0.9
Calibre[b]	4.77[a]	8.4[b]	0.4
P-value	**0.002**	**<0.001**	**0.062**
LSD (P≤0.05)	**0.40**	**0.9**	**NS**