Getting Started

User Guide

Contents

1 Introduction

This document describes how to begin using InVivoStat, including data importing, data manipulation, performing analyses and exporting results to other software.

For Windows users, once installed InVivoStat can be accessed from the Windows start menu.

2 Importing data into InVivoStat: Data formats

Data is imported into InVivoStat via Excel (using .xls or .xlsx file formats) or by a text editor using .csv (comma delimited) format. Although some basic data editing can be done in InVivoStat, it is recommended that the user first create the final dataset beforehand, including all data manipulations, before importing into InVivoStat.

> ***Warning – datasets cannot contain commas in either the variable names or the data itself. Variable names cannot also contain the symbols ~ (tilde), + (plus) or * (asterix) as these characters are used internally by InVivoStat. Users will not be able to load files that have such characters present.***

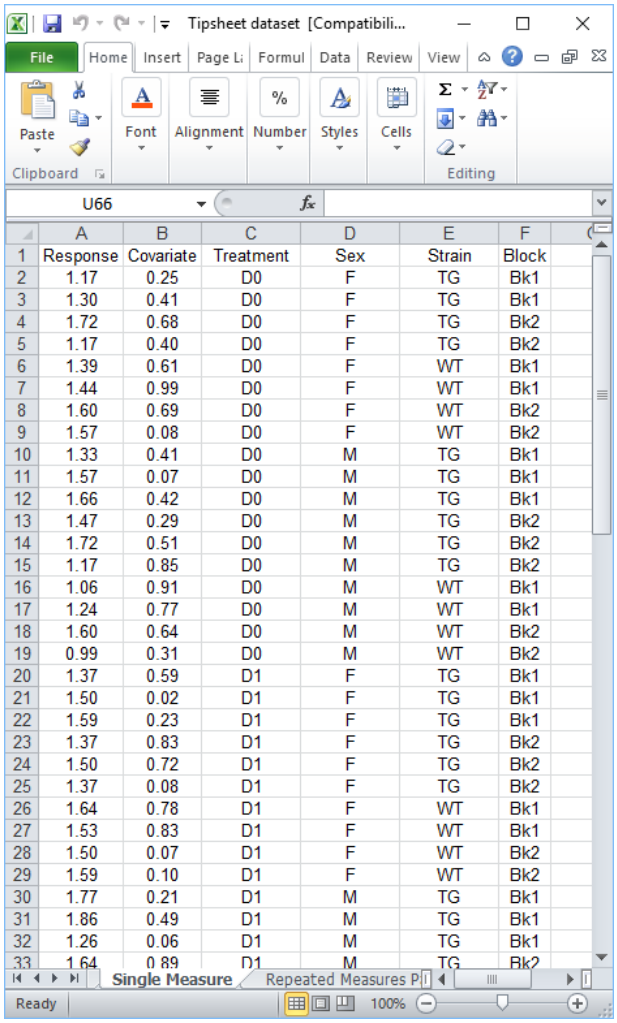
There are two common ways to organise your data, depending on the experimental design, before importing into InVivoStat. As a general rule

- The results of each parameter measured in the experiment should be placed in a single column of the dataset.
- Variable names should be placed in the first row of the dataset.
- Missing data should be left as empty cells in Excel or blank in the csv file.
- No text should be placed in numerical response columns (other than the variable name).

2.1 'Single measures' format

In this dataset format each animal is assessed once and once only for each parameter measured. Many different parameters can be measured but each one is 'different' and will be analysed separately. Each row of the dataset corresponds to the results generated from an animal. The results from each parameter are placed in a column of the dataset. Other columns to be included are the so-called 'Indicator columns' defining, for example, the animal ID, the treatment factor(s), gender and also any blocking factors.

Consider a study assessing three treatments that involves transgenic and wildtype animals of both sexes. In the experiment the measurements recorded include bodyweight, locomotor activity, latency and a covariate. The dataset contains a separate variable for each of these parameters, along with four indicator variables for Animal, Sex, Strain and Treatment (along with two nuisance blocking variables Block1 and Block2).

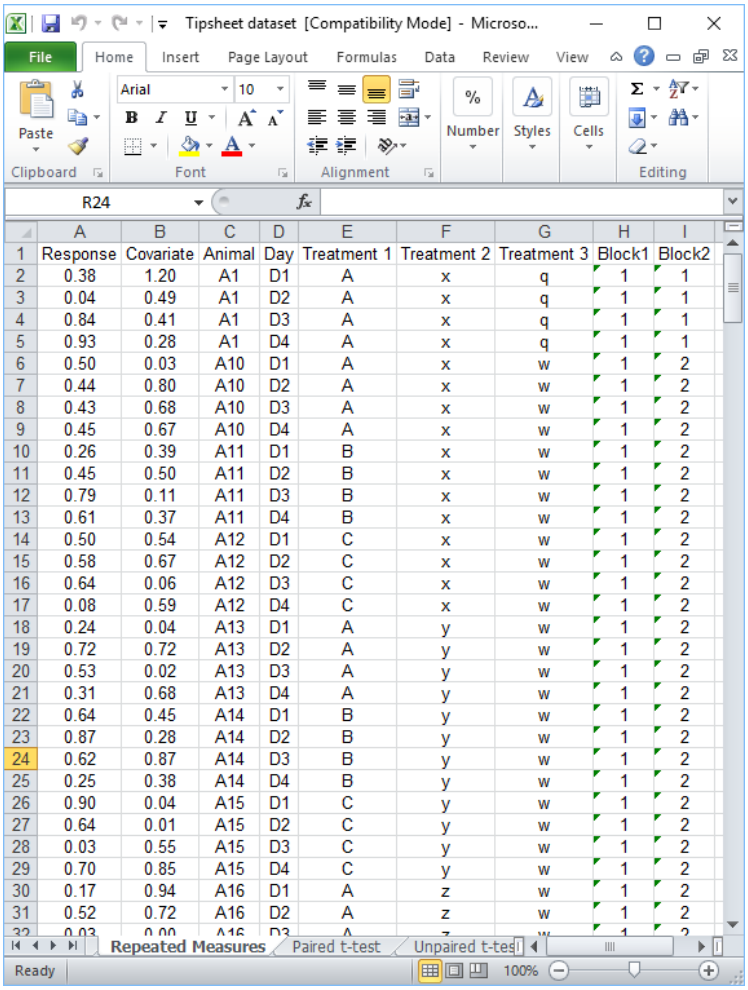


	A	B	C	D	E	F
1	Response	Covariate	Treatment	Sex	Strain	Block
2	1.17	0.25	D0	F	TG	Bk1
3	1.30	0.41	D0	F	TG	Bk1
4	1.72	0.68	D0	F	TG	Bk2
5	1.17	0.40	D0	F	TG	Bk2
6	1.39	0.61	D0	F	WT	Bk1
7	1.44	0.99	D0	F	WT	Bk1
8	1.60	0.69	D0	F	WT	Bk2
9	1.57	0.08	D0	F	WT	Bk2
10	1.33	0.41	D0	M	TG	Bk1
11	1.57	0.07	D0	M	TG	Bk1
12	1.66	0.42	D0	M	TG	Bk1
13	1.47	0.29	D0	M	TG	Bk2
14	1.72	0.51	D0	M	TG	Bk2
15	1.17	0.85	D0	M	TG	Bk2
16	1.06	0.91	D0	M	WT	Bk1
17	1.24	0.77	D0	M	WT	Bk1
18	1.60	0.64	D0	M	WT	Bk2
19	0.99	0.31	D0	M	WT	Bk2
20	1.37	0.59	D1	F	TG	Bk1
21	1.50	0.02	D1	F	TG	Bk1
22	1.59	0.23	D1	F	TG	Bk1
23	1.37	0.83	D1	F	TG	Bk2
24	1.50	0.72	D1	F	TG	Bk2
25	1.37	0.08	D1	F	TG	Bk2
26	1.64	0.78	D1	F	WT	Bk1
27	1.53	0.83	D1	F	WT	Bk1
28	1.50	0.07	D1	F	WT	Bk2
29	1.59	0.10	D1	F	WT	Bk2
30	1.77	0.21	D1	M	TG	Bk1
31	1.86	0.49	D1	M	TG	Bk1
32	1.26	0.06	D1	M	TG	Bk1
33	1.64	0.89	D1	M	TG	Bk2

2.2 'Repeated measures' format

If a parameter is measured repeatedly on each animal, for example over time, then the dataset must be formatted in a slightly different way to that described previously. In this case the responses recorded for each parameter are still placed in a single column of the dataset, but in this case each animal's data is present in multiple rows of the dataset. An extra column is included in the dataset to identify the levels of the repeated factor and a second variable identifies the individual animals. Other indicator variables can be added to the dataset as before and covariates can also be included as extra columns of the dataset. The dataset can be described as 'long and thin'.

For example, consider an experiment where the response of the animals was measured pre-treatment (the covariate) and on Days 1, 2, 3 and 4. Treatments are labelled A, B and C. The dataset should be set up as follows:



	A	B	C	D	E	F	G	H	I
1	Response	Covariate	Animal	Day	Treatment 1	Treatment 2	Treatment 3	Block1	Block2
2	0.38	1.20	A1	D1	A	x	q	1	1
3	0.04	0.49	A1	D2	A	x	q	1	1
4	0.84	0.41	A1	D3	A	x	q	1	1
5	0.93	0.28	A1	D4	A	x	q	1	1
6	0.50	0.03	A10	D1	A	x	w	1	2
7	0.44	0.80	A10	D2	A	x	w	1	2
8	0.43	0.68	A10	D3	A	x	w	1	2
9	0.45	0.67	A10	D4	A	x	w	1	2
10	0.26	0.39	A11	D1	B	x	w	1	2
11	0.45	0.50	A11	D2	B	x	w	1	2
12	0.79	0.11	A11	D3	B	x	w	1	2
13	0.61	0.37	A11	D4	B	x	w	1	2
14	0.50	0.54	A12	D1	C	x	w	1	2
15	0.58	0.67	A12	D2	C	x	w	1	2
16	0.64	0.06	A12	D3	C	x	w	1	2
17	0.08	0.59	A12	D4	C	x	w	1	2
18	0.24	0.04	A13	D1	A	y	w	1	2
19	0.72	0.72	A13	D2	A	y	w	1	2
20	0.53	0.02	A13	D3	A	y	w	1	2
21	0.31	0.68	A13	D4	A	y	w	1	2
22	0.64	0.45	A14	D1	B	y	w	1	2
23	0.87	0.28	A14	D2	B	y	w	1	2
24	0.62	0.87	A14	D3	B	y	w	1	2
25	0.25	0.38	A14	D4	B	y	w	1	2
26	0.90	0.04	A15	D1	C	y	w	1	2
27	0.64	0.01	A15	D2	C	y	w	1	2
28	0.03	0.55	A15	D3	C	y	w	1	2
29	0.70	0.85	A15	D4	C	y	w	1	2
30	0.17	0.94	A16	D1	A	z	w	1	2
31	0.52	0.72	A16	D2	A	z	w	1	2

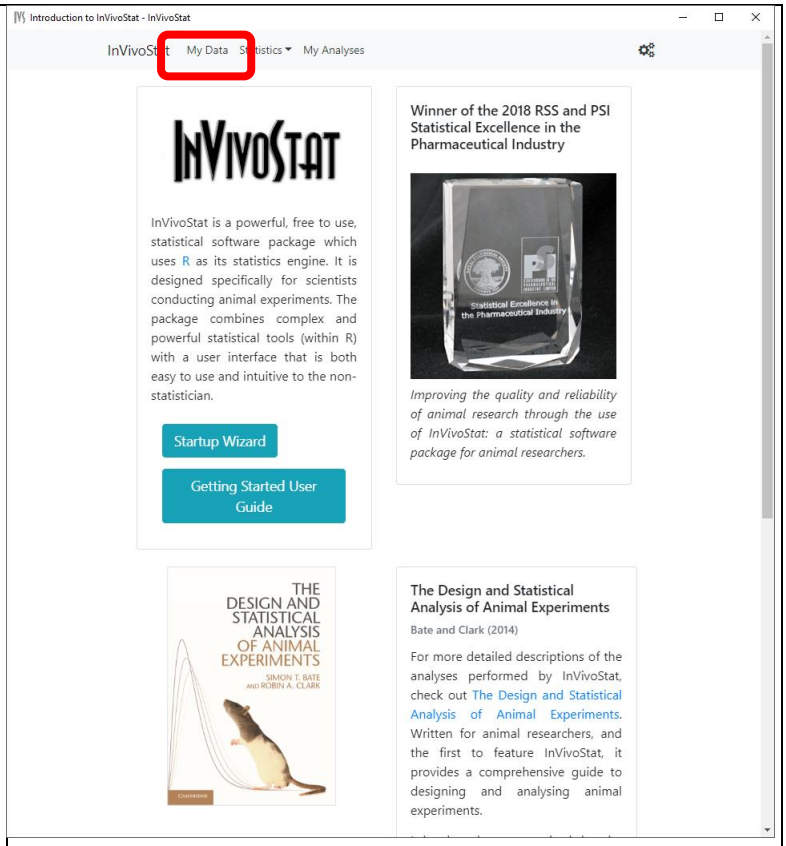
2.3 Other formats

Some of the other modules (for example, Chi-Squared and Fisher's Exact test, Nested Design Analysis and Survival Analysis) require specialised formats. These are described in the relevant user guides.

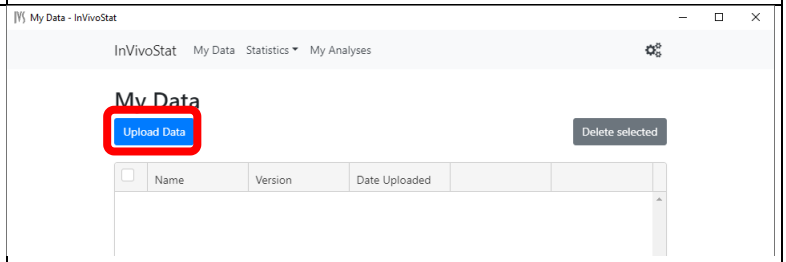
2.4 Importing a dataset into InVivoStat

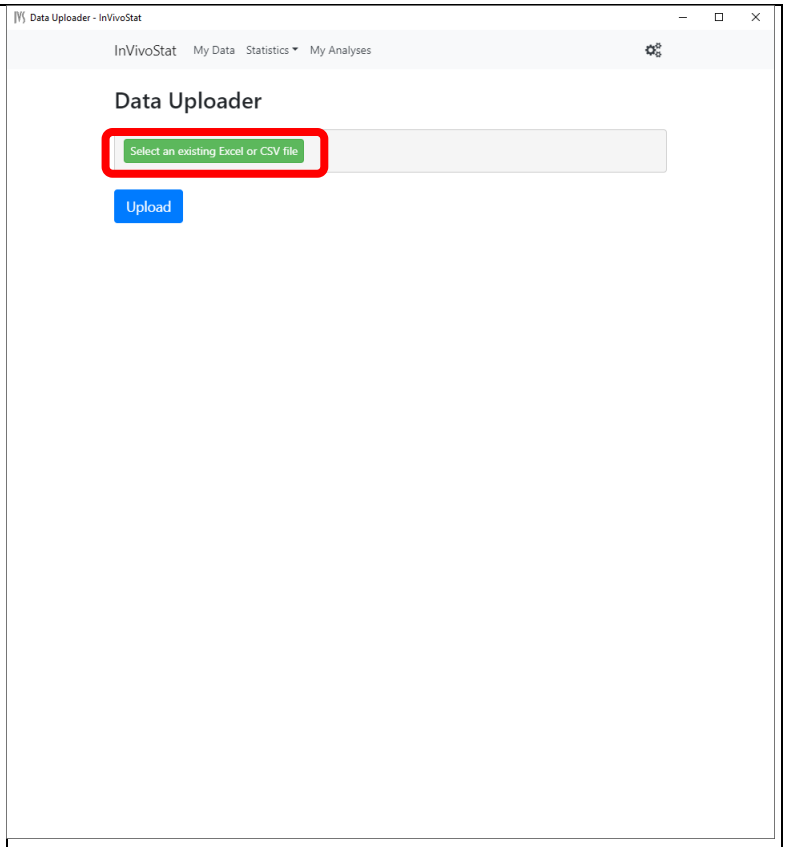
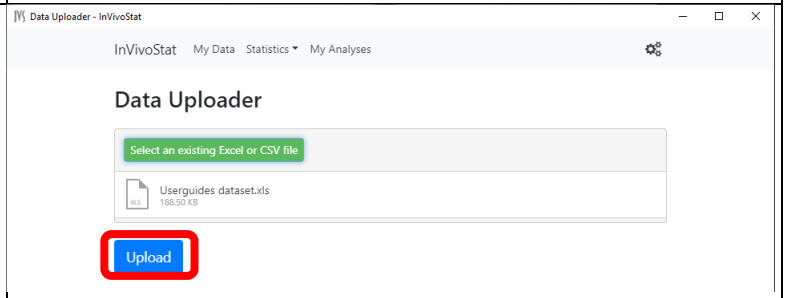
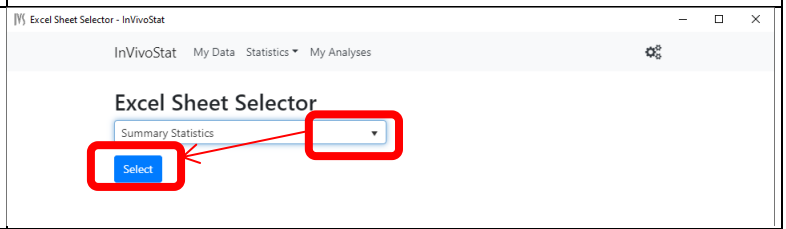
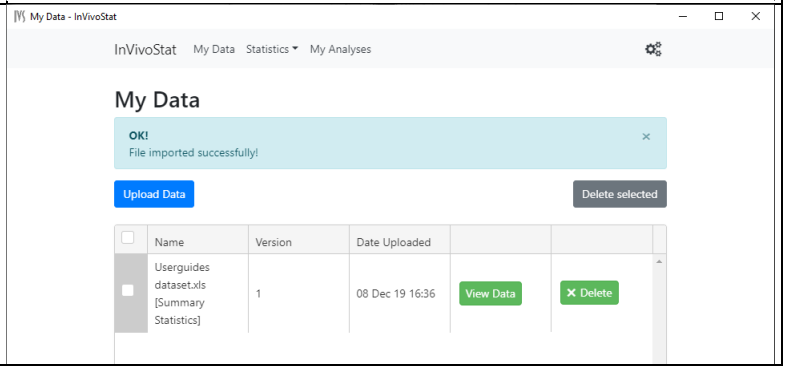
Open InVivoStat from the start menu.

Click on ‘My Data’.



Click on ‘Upload Data’.

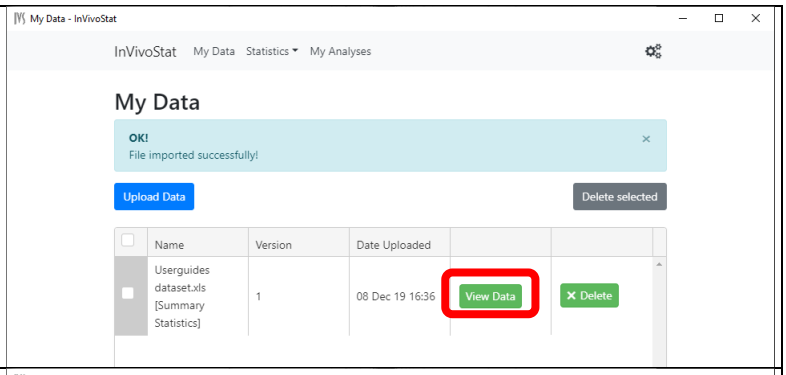


Click on 'Select an existing Excel or CSV file'. Go to the file that you want to open in InVivoStat.	
Click on 'Upload'.	
If importing from Excel, select the worksheet within the workbook that you want to open. Click on 'Select'.	
The data is now imported.	

3 Data management

While it is recommended that most of the data manipulation should be made prior to importing into InVivoStat, there are a few operations that can be carried out within InVivoStat itself.

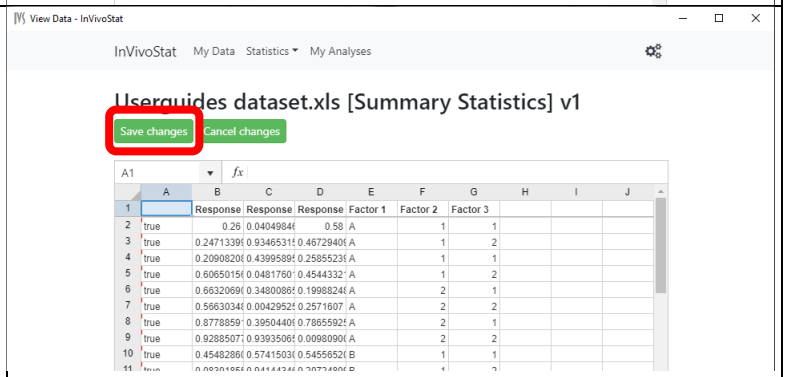
To edit the data, click on ‘View Data’.



Data edits that can now be performed, including:

- Changing variable names.
- Editing data values.
- Deleting of individual data.

Remember to ‘Save changes’ before exiting.

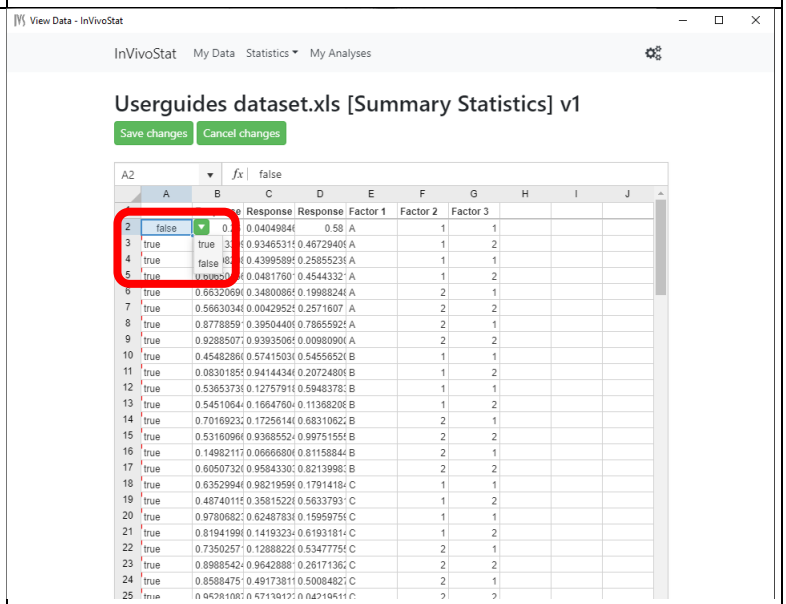


Individual rows of the data can be excluded from the analysis.

In column ‘A’, using the drop-down menu change ‘true’ to ‘false’ to remove the row from the dataset used in the analysis.

If you have multiple observations you want to exclude, then you can copy and paste ‘false’ onto the other observations (rather than click on the drop-down menu) or drag-and-drop to exclude multiple neighbouring observations.

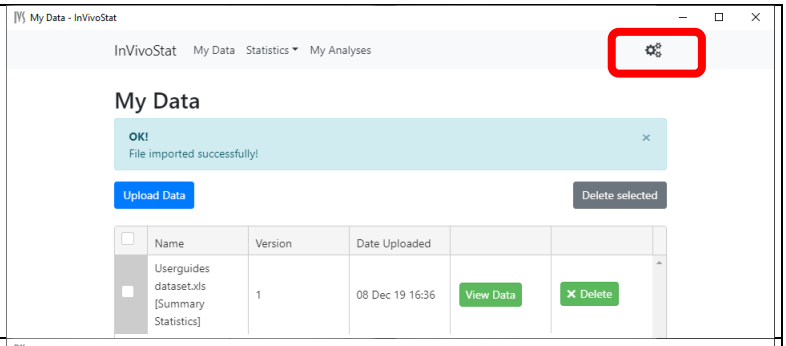
Remember to ‘Save changes’ before exiting.



4 Output management

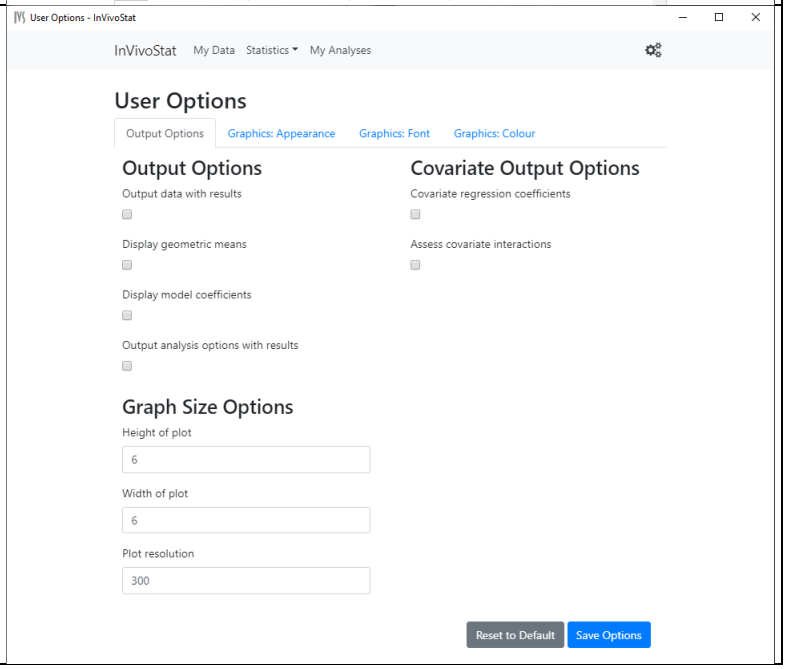
The user has the ability to change many properties of the graphical output of InVivoStat and also some of the results given in the output window.

Go to the output management interface to make changes to the output.



Within this window, the user can select additional analysis results, manipulate the InVivoStat Output, and change the plotting parameters.

A full description of the options available in the User Options window can be found in the Section 10 of this user guide.



5 Performing an analysis

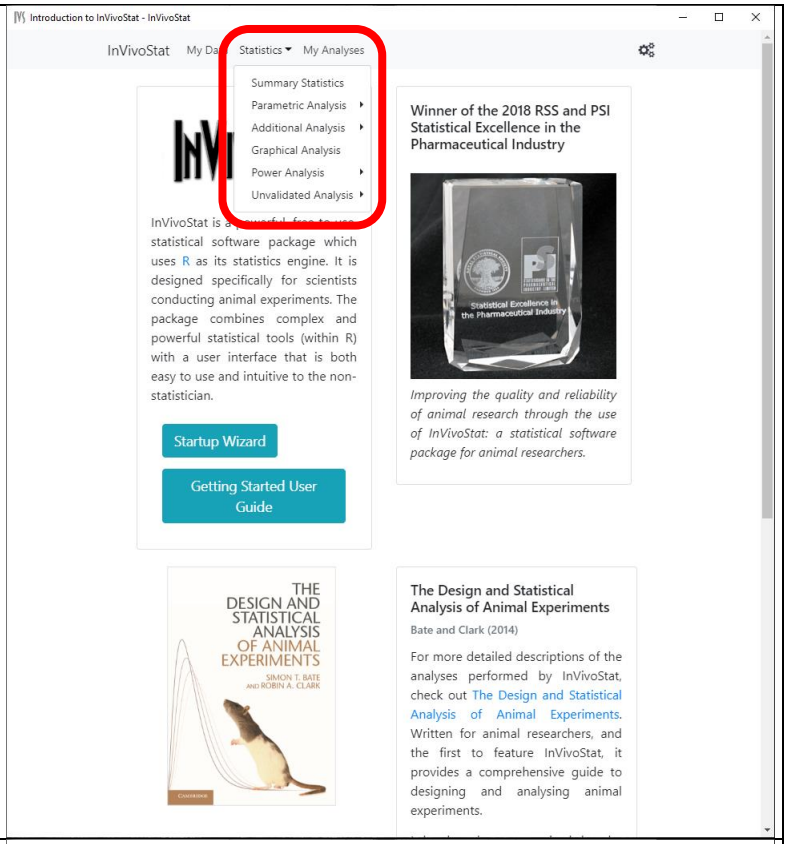
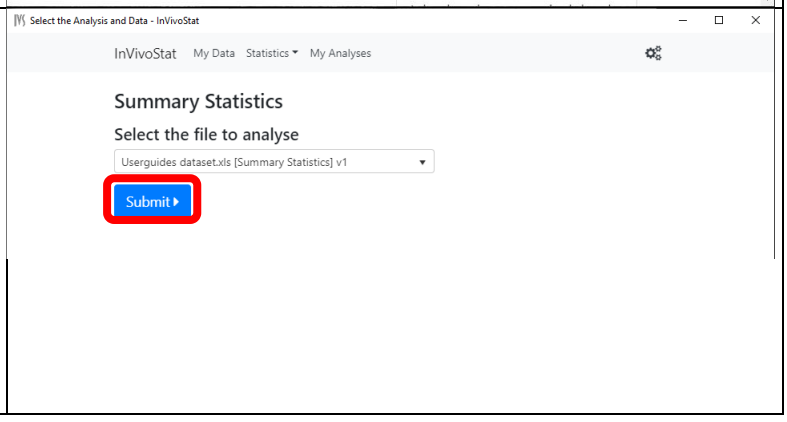
Once the dataset has been loaded into InVivoStat the user is in a position to perform the analysis of their choice. The analysis modules available include:

- *Summary Statistics*
- Parametric Analysis
  - *Single Measure Parametric Analysis* (inc. t-test, ANOVA and ANCOVA)
  - *Repeated Measures Parametric Analysis*
  - *P-value Adjustment* (adjustments for multiple comparisons)
  - *Extended Paired t-test and Within-subject Analysis*
  - *Unpaired t-test Analysis* (including Welch's t-test)
  - *Correlation Analysis*
  - *Linear Regression Analysis*
  - *Dose-response and Non-linear Regression Analysis*
  - *One-sample t-test Analysis*
- Additional Analysis

- *Non-parametric Analysis* (inc. Kruskal-Wallis and Mann-Whitney tests)
- *Chi-squared and Fisher's Exact Test*
- *Survival Analysis*
- *Multivariate Analysis*

- Graphical Analysis
- Power Analysis
  - *Comparison of Means*
  - *One-way ANOVA*
- Unvalidated Analysis
  - *Nested Design Analysis*
  - *Incomplete Factorial Parametric Analysis*

A full description of the specific analysis options are given in the individual user guides. These can be accessed via the Help button on the module interfaces.

To begin, click on the Statistics drop-down list and select the module to use. In this user guide, the Summary Statistics module will be employed.	
Once the module is selected, the dataset is chosen from the drop-down list of available datasets. Where the data is imported from within an Excel file, the data identifier will include the Excel filename and worksheet name (in square brackets). Click on 'Submit' when the dataset has been selected.	

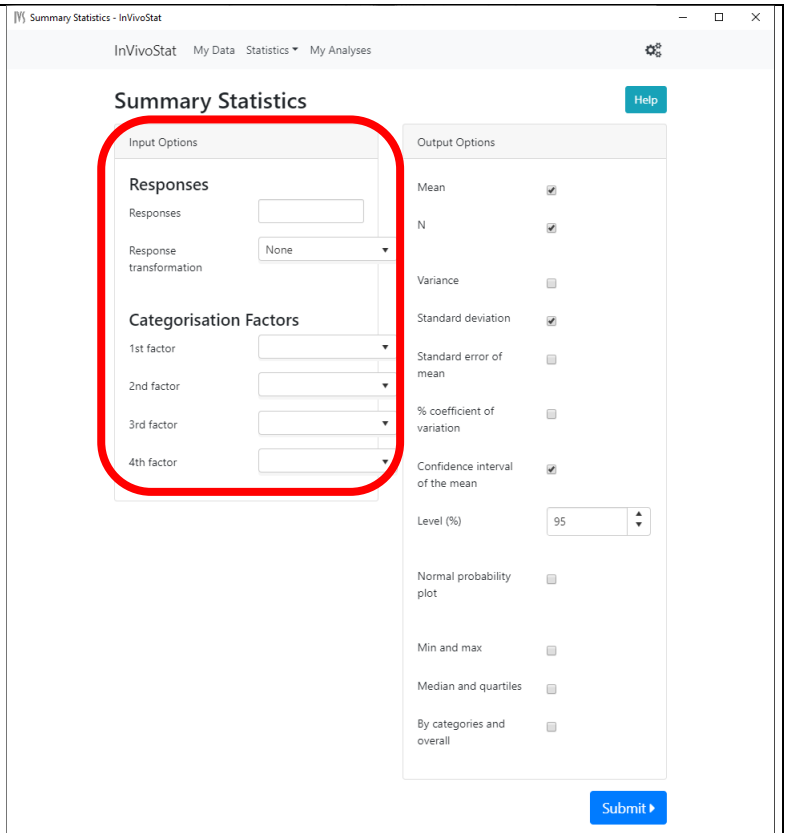
Input Options

Analysis inputs can be selected on the LHS of the interface.

In general, the user can select:

a) *Input variables*, by clicking on the box and selecting from the drop-down list of variables.
b) *Analysis options*, usually from a drop-down list.

Note for certain input variables only a single variable can be selected, whereas in other cases multiple variables can be selected.

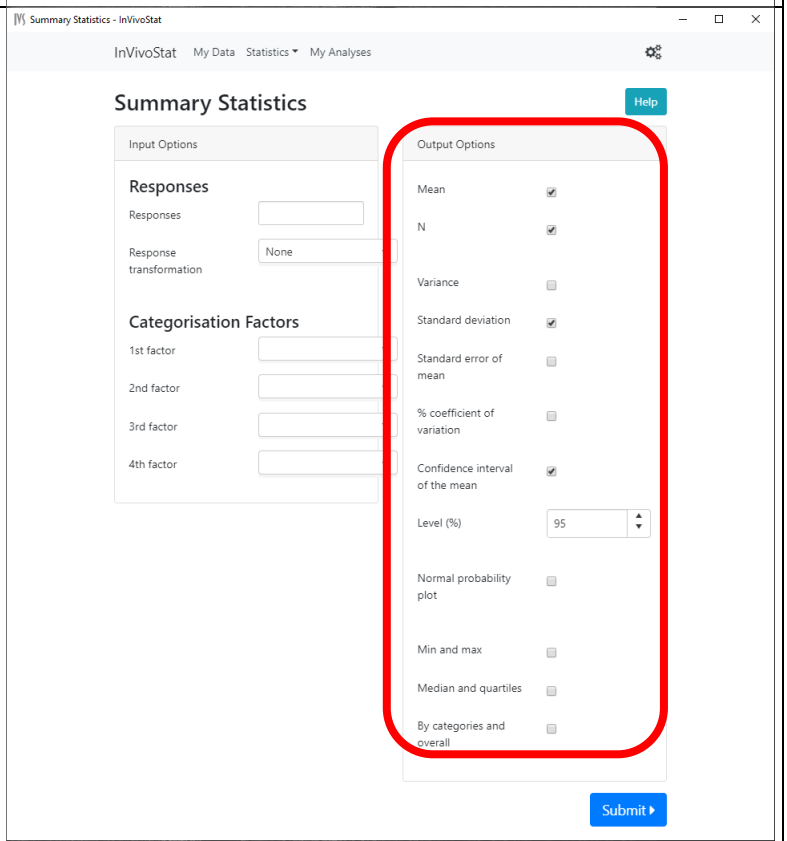


Output Options

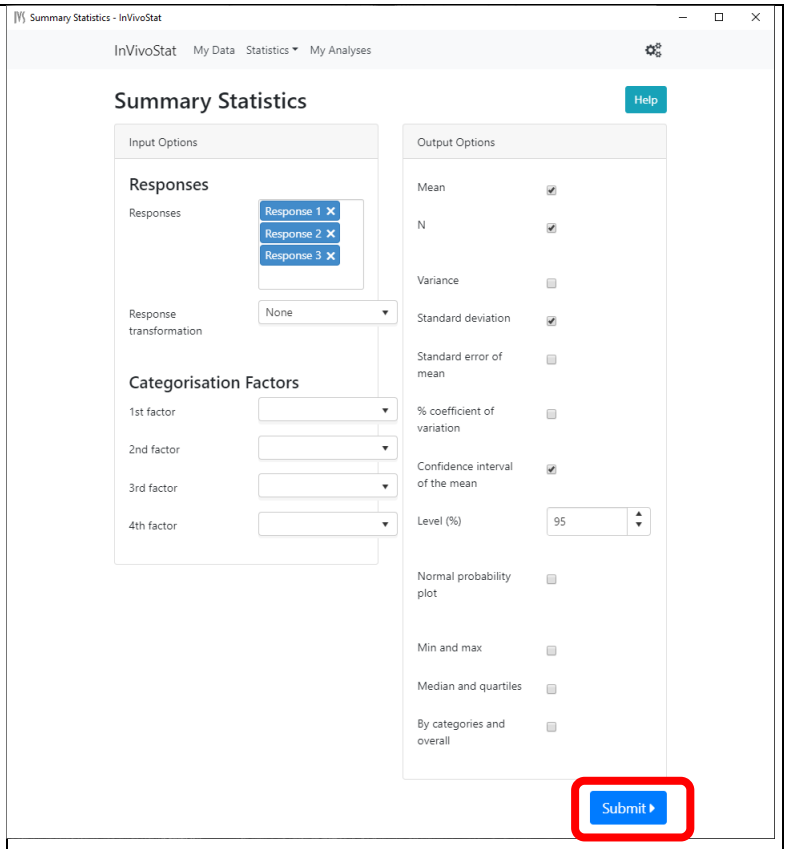
Output options can be selected on the RHS of the interface.

The user can select:

a) *Analysis results*, to include in the statistical output.
b) *Parameters for the analysis* (for example, the significance level).

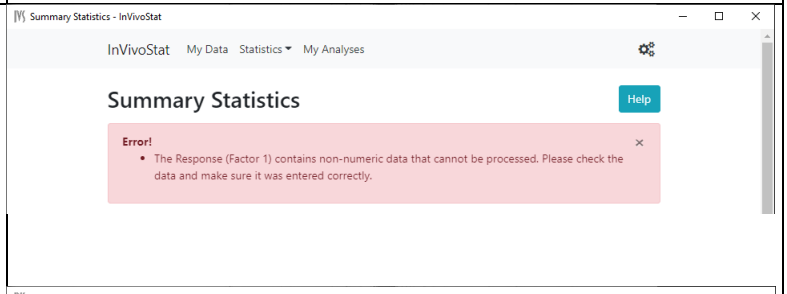


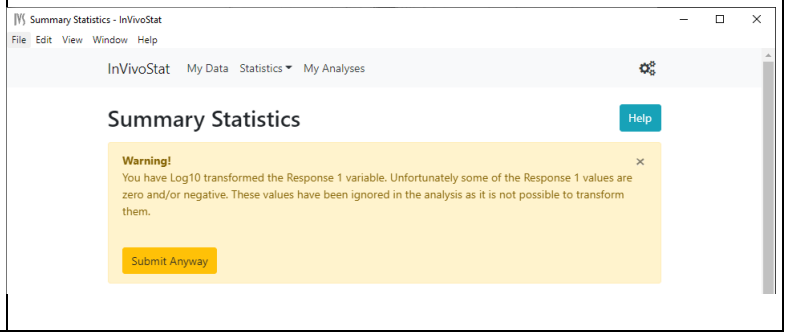
Finally, the user should click on 'Submit' to run the statistical analysis.



InVivoStat now runs various checks on the dataset and parameters selected (analysis module dependent).

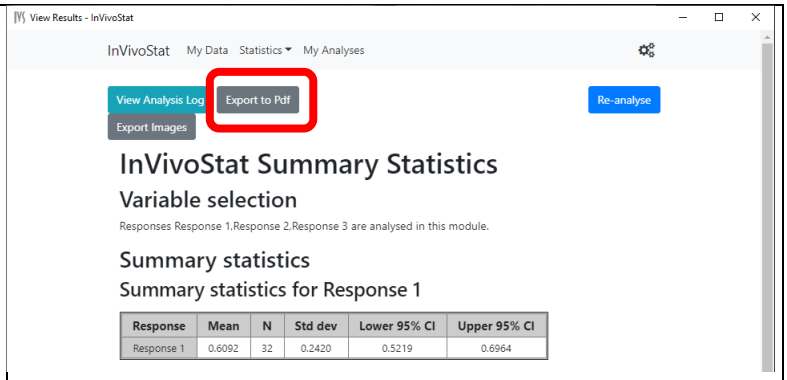
Error or warning messages are given at the top of the input window (see Section 6 for more details).





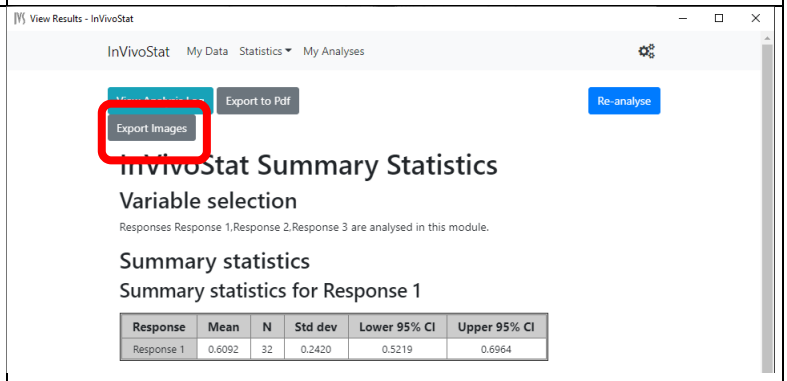
Once the analysis results have been generated, the user can:

1) Save all the output as a pdf file.



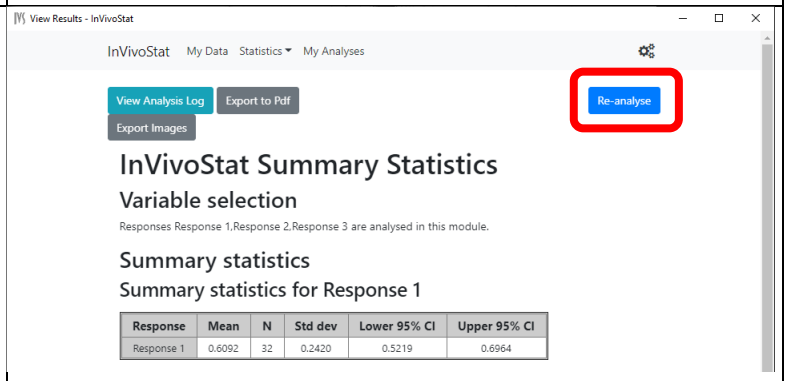
Once the analysis results have been generated, the user can:

2) Save all the individual plots as .png files in a zip file for import into other software packages.



Once the analysis results have been generated, the user can:

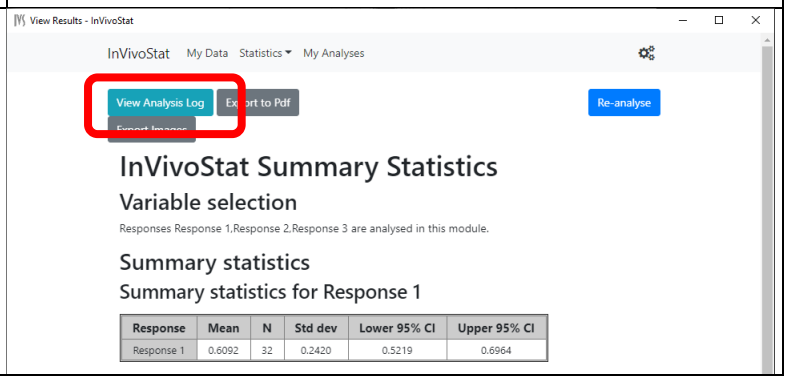
3) Return to the analysis dialogue box to amend their selections.



Once the analysis results have been generated, the user can:

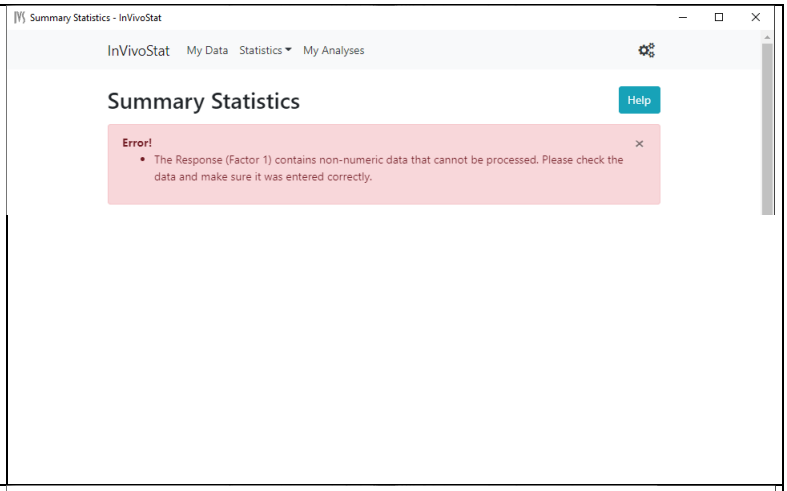
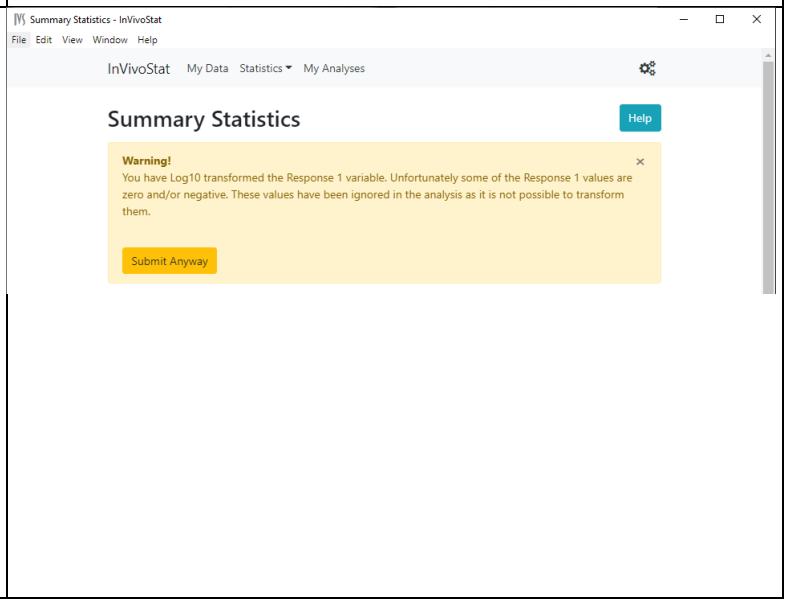
4) View the analysis log file.

See Section 7 for more details.



6 Error and warning messages

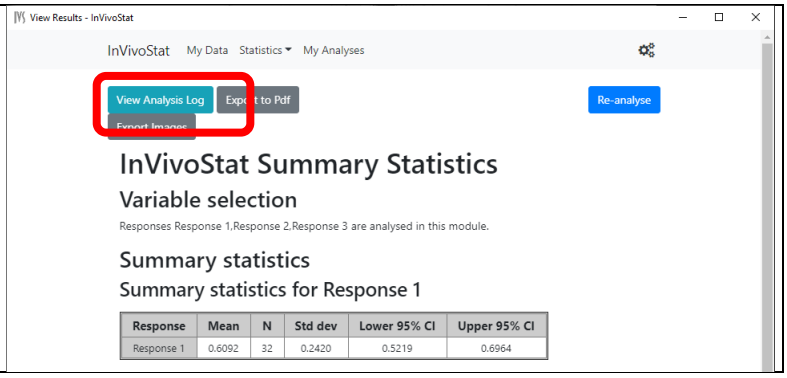
When running any analysis InVivoStat performs checks of the data and analysis choices. These fall into two categories ‘Errors’ and ‘Warnings’. Messages are given at the top of the input window.

Error messages: Once an error message has been generated the analysis will not proceed. The analysis results would probably be misleading if allowed to proceed. The user must return to the analysis dialogue and make any changes necessary to address the error message.	
Warning messages: Warning messages are differentiated from error messages by a yellow text box. Warning messages are more for information and are identified by yellow text boxes. They may highlight the need for user intervention, but in most cases they merely inform the user of a possible issue with the dataset and/or analysis options. The analysis can proceed following a warning message.	

7 Log file

Once the analysis has been completed, the user can view a log file containing other information about the analysis. The log is available by clicking on the 'View Analysis Log' button at the top of the Results window. The log should be viewed if InVivoStat produces no output. It may give the user some information explaining why the analysis did not complete.

The log file can be accessed for all analysis output windows.

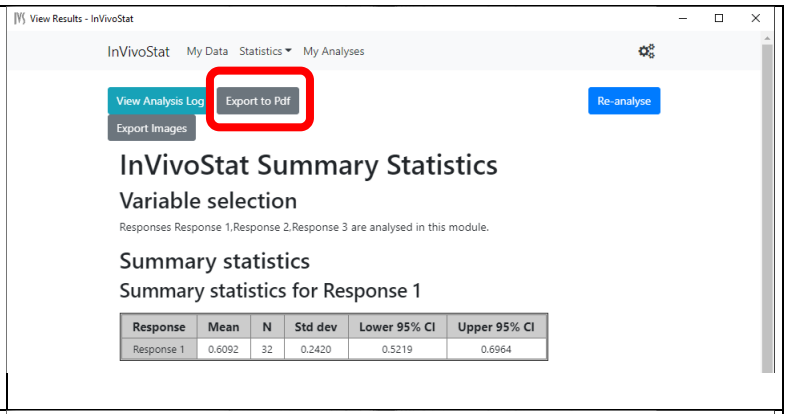


8 Exporting results

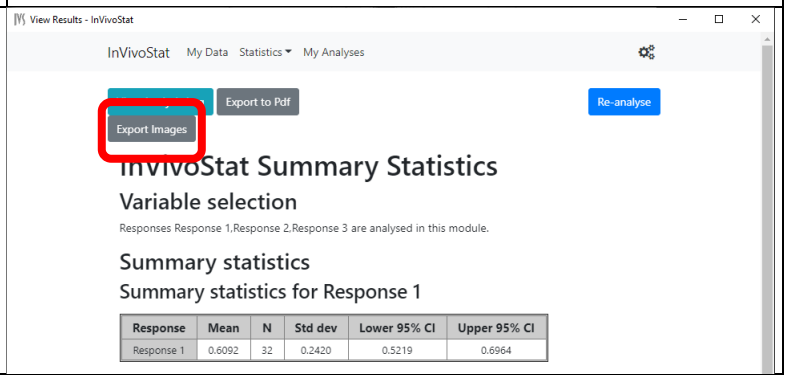
Once the results have been generated then they can be exported in a number of different formats.

The output file can also be stored as a pdf file, including all analysis results and potentially the dataset that was used in the analysis (see Section 10).

Once generated the pdf file can be saved by right clicking on the generated pdf output.

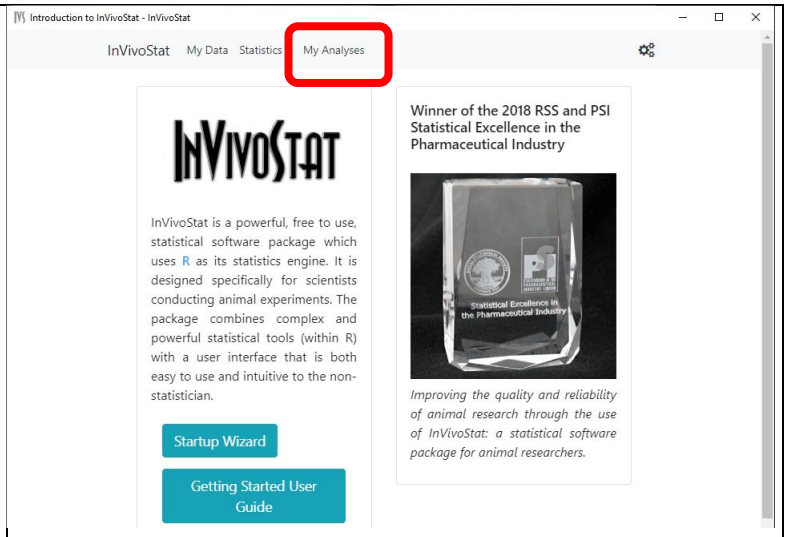
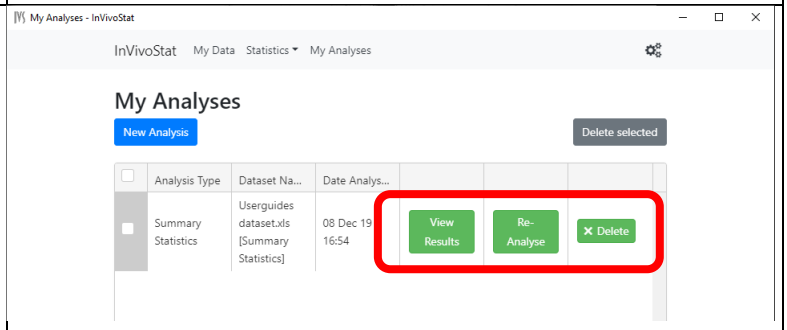


The individual plots contained with the InVivoStat output can be saved as .png files. By clicking on the "Export Images" button, InVivoStat will create a zip file containing the .png files. These can then be opened in other packages.



9 Re-running analyses

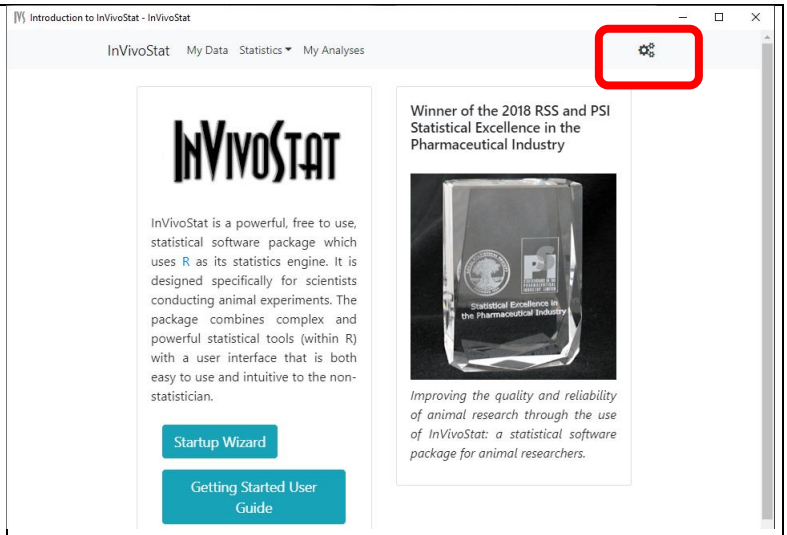
Previous analyses can be re-ran, and results re-generated, using the 'My Analysis' window.

Click on the 'My Analysis' button.	
Previous analyses are listed in the My Analyses window. You can: 1) View previously generated results ('View Results'). 2) Re-run an analysis ('Re-Analyse'). 3) Delete an analysis from the list ('Delete') if you no longer need a record of the analysis.	

10 User options

The user has the ability to control various aspects of the InVivoStat output. This includes controlling the style and output of all plots generated within InVivoStat, the choice of results generated, and whether the dataset is included in the output.

Click on the  button on the top right-hand side of the interface to open the User Options interface.



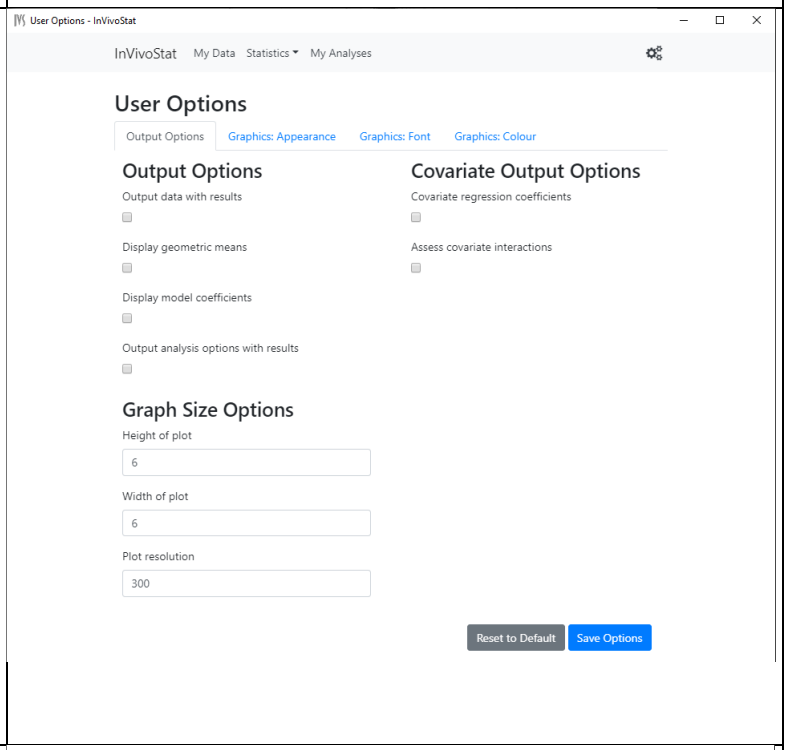
The User options window consists of four tabs:

1) *Output Options*
   General options, including which output to display.

2) *Graphics Appearance*
   Graphical appearance options, including point markers and line properties.

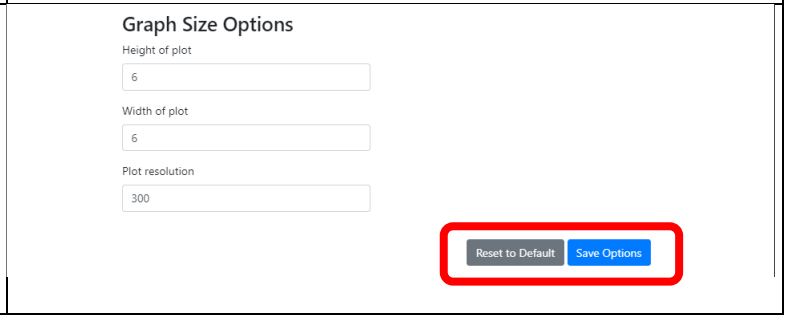
3) *Graphics Font*
   Options to control the fonts of all text appearing on the plot.

4) *Graphics Colour*
   Options to control the colour palette, including generation of black & white plots.

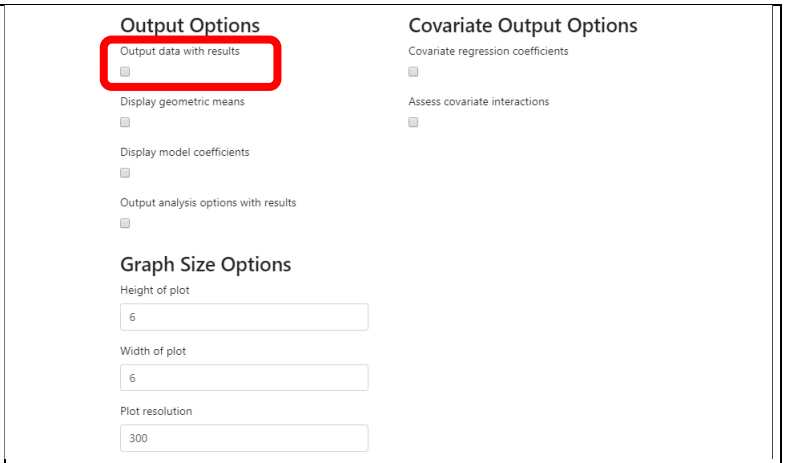
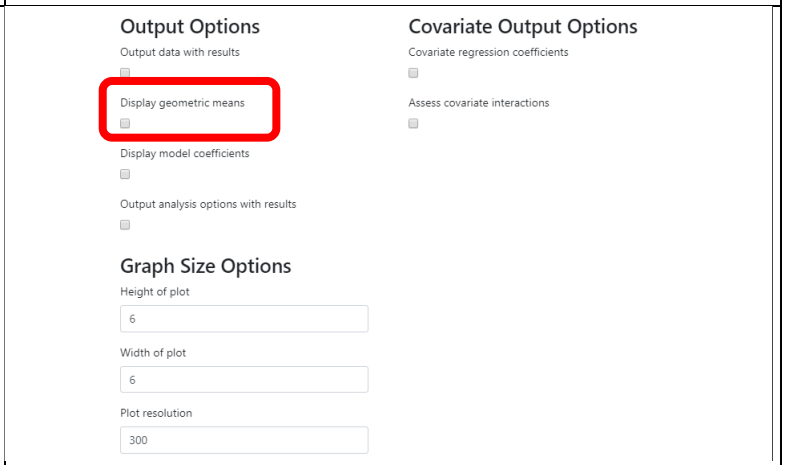
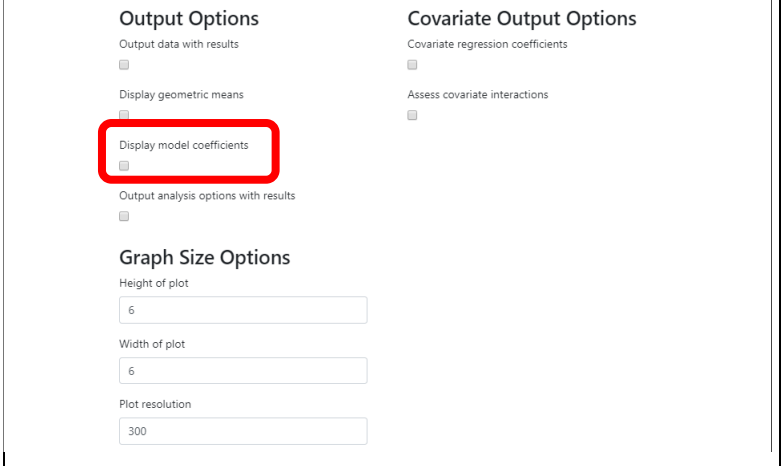
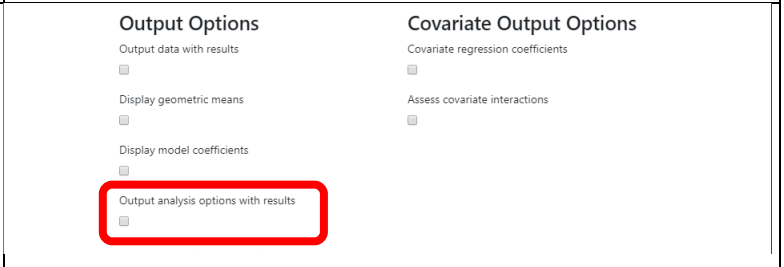


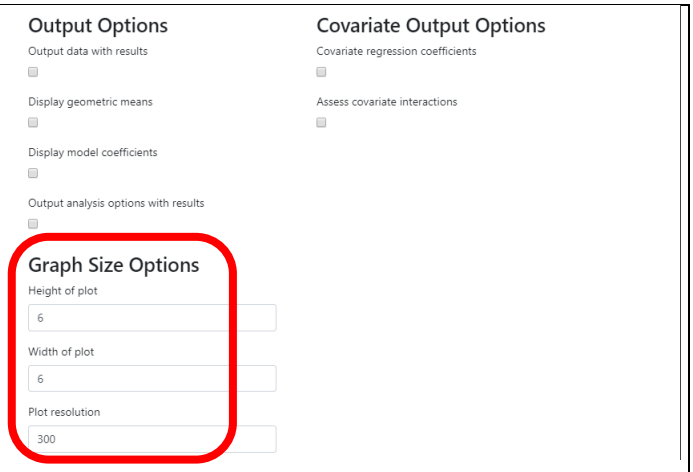
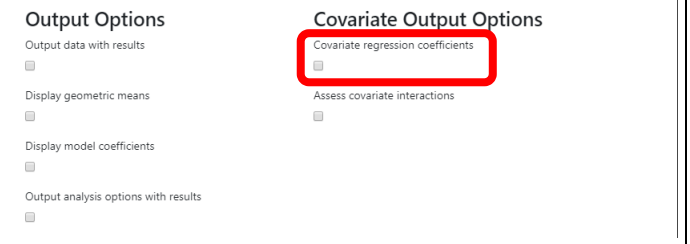
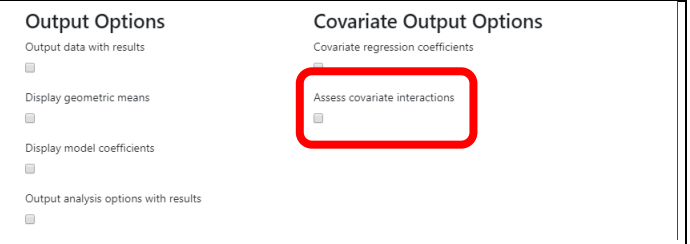
At any time, the user can restore the Output Options to the default settings.

Once the settings have been edited, they must be saved before progressing with any analysis.



Output Options

'Output data with results'. When selecting this option, InVivoStat will include a printout of the data being analysed at the end of the output.	
'Display geometric means' For the parametric analyses, if a log transformation is applied to the response prior to analysis, and hence the analysis is performed on the log scale, then by selecting this option the output will also include the back-transformed geometric means (on the original scale) alongside the Least Square (predicted) means on the log scale.	
'Display model coefficients' For the Single Measures Parametric Analysis module, by selecting this option the coefficient solutions of the fixed effects will be included in the output. Note these results are automatically generated in the Linear Regression module.	
'Output analysis options with results' When selecting this option, InVivoStat will include in the output a list of the analysis options selected by the user.	

'Graph Size Options' (size and resolution) InVivoStat generates plots (within the HTML output) as .png files. These options control the size of the png files. The resolution of the plots can also by increased from the default 300 dpi for publications. Right clicking on the plots allows the user to extract individual png files.	
'Covariate regression coefficients' When a covariate is included in a parametric statistical model, select this option and the output will include the covariate regression coefficients (i.e. the slope of the overall regression line).	
'Assess covariate interactions' When a covariate is included in a parametric statistical model, InVivoStat assumes the covariate by treatment interactions are non-significant. The recommended approach to assess this assumption is to consider the categorised scatterplots (presented by default in the output). Select this option and the results of the statistical model including these interactions is given. This allows the user to make a more formal assessment of the covariate interactions.	

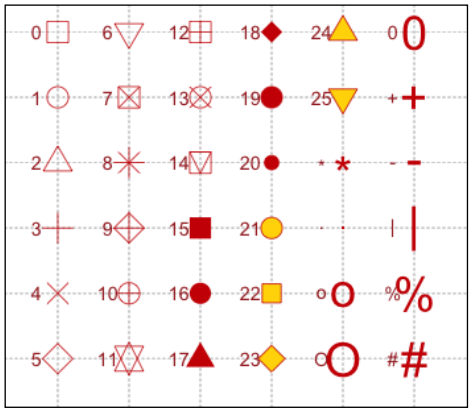
Graphics: Appearance

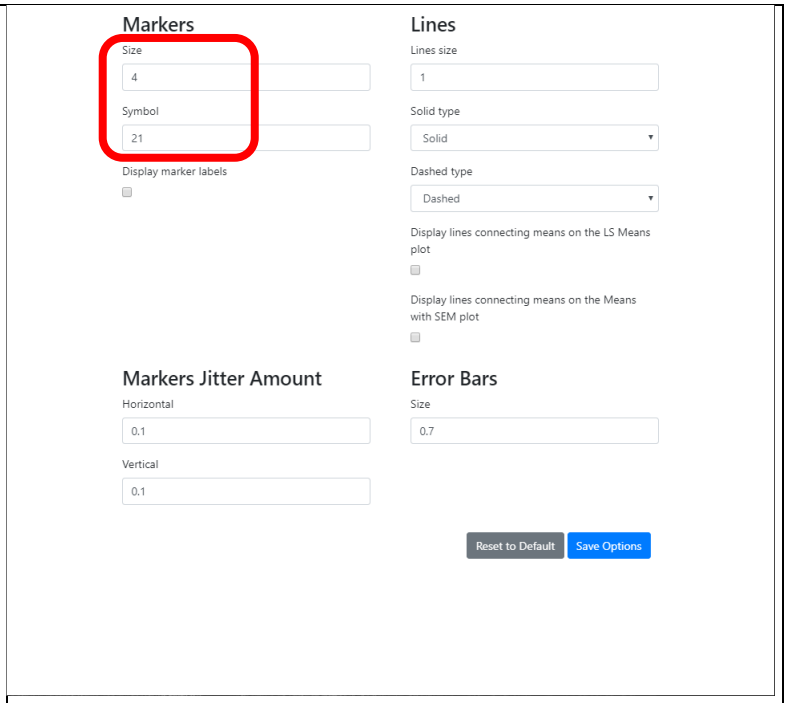
‘Markers’ (size and type)

The user can change the marker and size used for points on plots.

Plots affected include scatterplots, means with SEM plots (line plot version), case profile plots, predicted vs. residual plots, normal probability plots, box plots (outliers) and survival plots (censored observations).

Marker symbols available include:





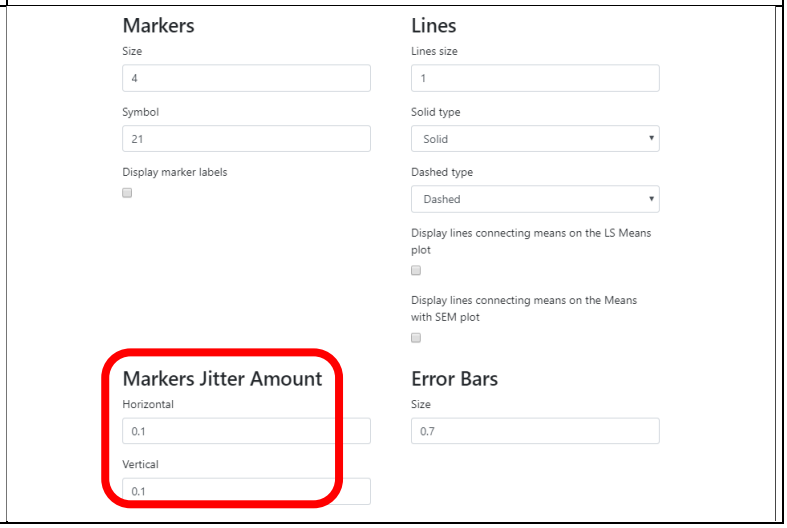
‘Display marker labels’

For scatterplots, by selecting this option each marker is labelled with the case ID number. This can be useful for identifying potential outliers or unusual responses in large datasets.

‘Marker Jitter Amount’

In the Graphics Module, when the axes are categorical (i.e. non-numeric) then on scatterplots the user has the option of adding a random jitter to the markers to allow the user to see all individual results.

This option allows the user to control the amount of random jitter applied to the markers.



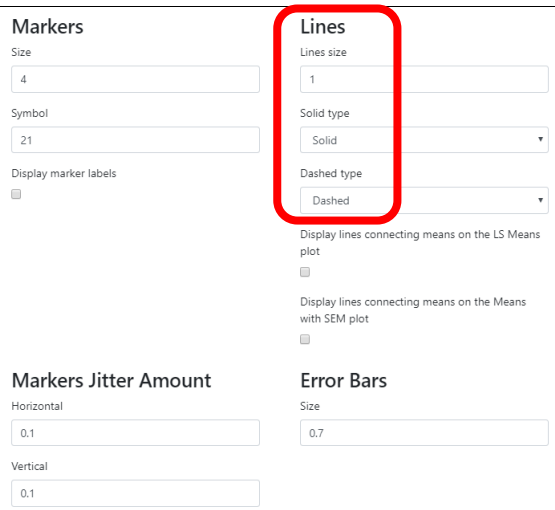
‘Lines’

The user can change the thickness and pattern of lines included on InVivoStat’s plots.

Applies to many plots, including regression lines on scatterplots, lines connecting means on LS Means plots, error bars and normal curves on histograms.

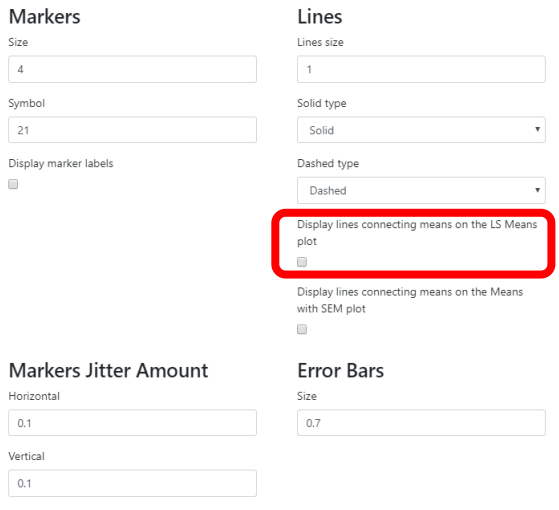
User can control the line type for the default solid lines separately from the default dashed lines.

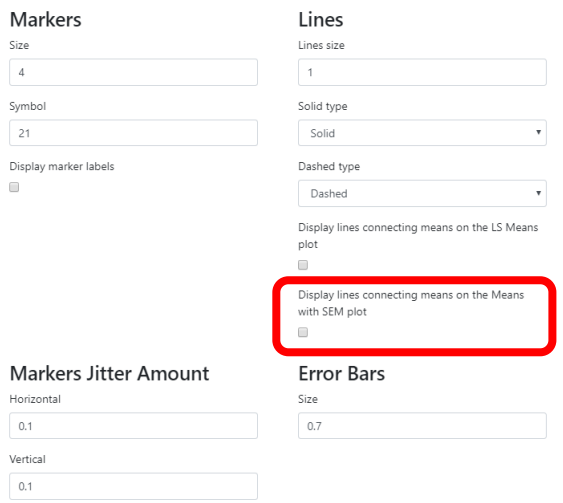
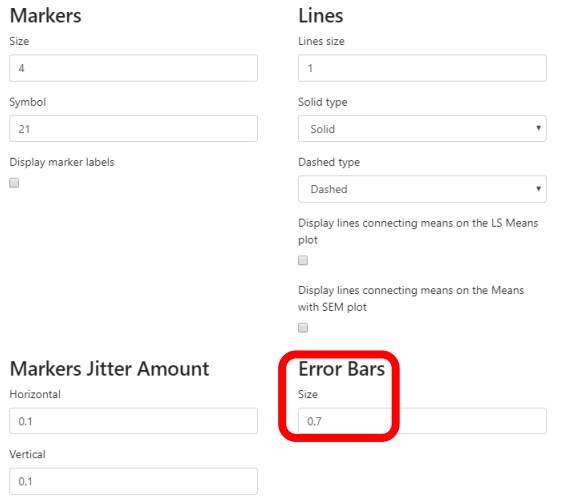
Line types available include:



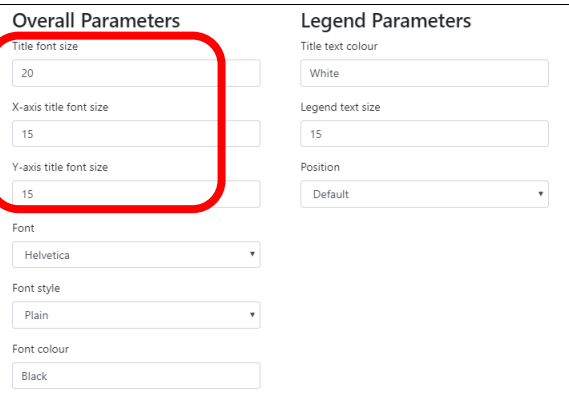
‘Display lines on the LS Means plot’

By default the least square means, presented on the LS Means plots in the parametric analysis modules, are not connected by a line. Selecting this option will include lines connecting the means.



'Display lines on the Plot of Means with SEM' By default the means presented on the Means with SEM plot in the Graphical Analysis module, are not connected by a line. Selecting this option will include lines connecting the means.	
'Error Bars size' This option allows the user to control the width of the whisker on the Means with SEM plot in the Graphics Analysis module and the whiskers on the confidence intervals on the LS Means plot.	

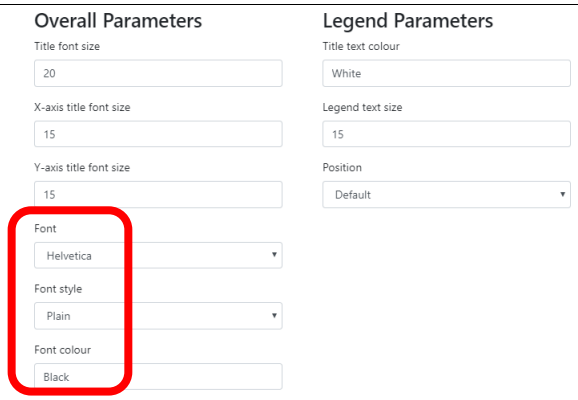
Graphics: Font

'Overall Parameters' (font sizes) These options allow the user to control the font size of the main plot title and the X-axis and Y-axis titles on plots.	

‘Overall Parameters’ (styles)

These options allow the user to control the font type, style and colour of any text appearing on the plots.

Font styles available include plain, italic or bold.



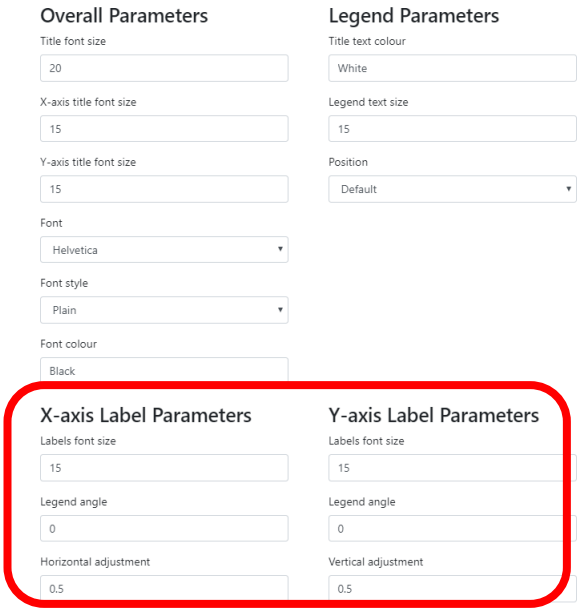
‘X(Y)-axis Label Parameters’

These options allow the user to control the font size and orientation of the X-axis and Y-axis labels on the plots.

The default angle for the X- and Y-axis labels is horizontal.

X-axis horizontal adjustment controls the relative position of the X-axis labels in relation to the tick marks.

Y-axis vertical adjustment controls the relative position of the Y-axis labels in relation to the tick marks.

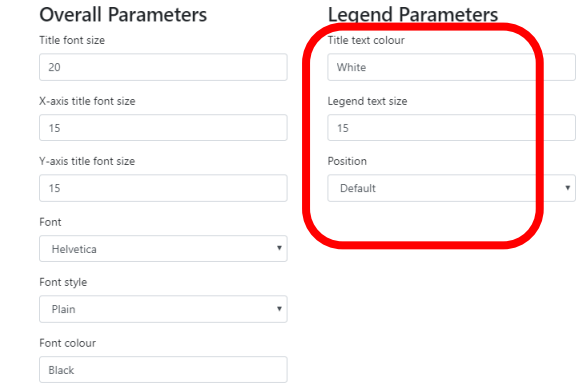


‘Legend Parameters’

These options control the legend title and text colour.

This title text option defines the colour of the Legend title text, where the title corresponds to the factor whose levels are given in the legend. The default colour is white (hence legend title not shown).

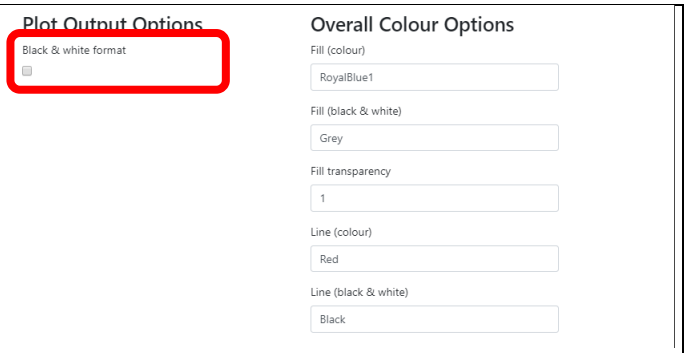
The user can also select the position of the legend, over-riding the default location. Options include Right, Left, Top or Bottom. The ‘Default’ option varies depending on the plot.



Graphics: Colour

‘Black & white format’

By selecting this option, InVivoStat will produce all plots using a black & white scheme.

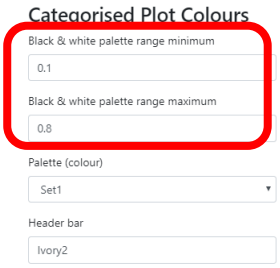


‘Black & white palette range’

These options apply when selecting the black & white scheme.

For the categorised plots these options define the grey scale gradient used to differentiate the categories on the plots, where = 0 white and 1 = black.

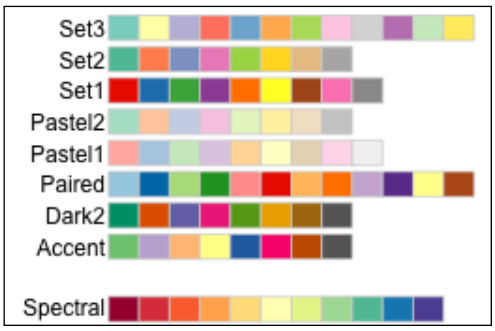
The default options produce a range that is off-white to dark-grey.

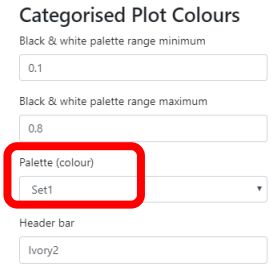


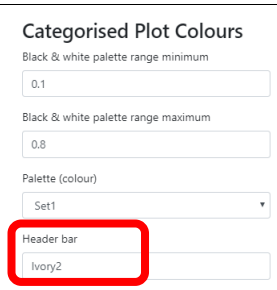
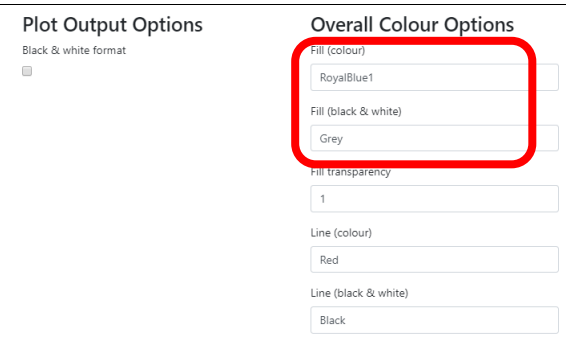
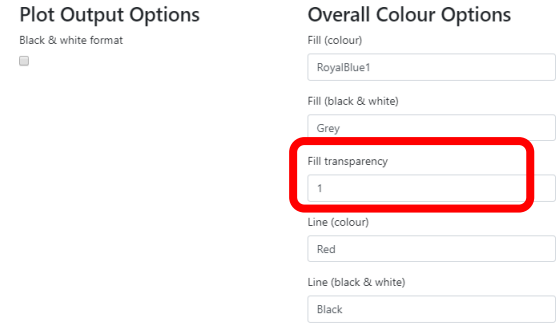
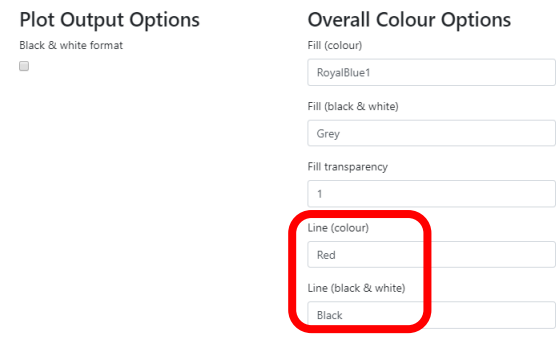
‘Palette (colour)’

This option defines the colour palette used to differentiate the categories on the categorical plots.

Palettes available in a drop-down list include:





'Header bar' This option defines the colour of the header bar in the 'separate' categorised plots.	
'Fill (colour/ black & white)' These options control the colour of the fill areas on the plots, for example the colour of the bars on the Means with SEM plot, the markers used on the scatterplot, bars on the histogram plot and boxes on the box-plot. A full list of colours available are given in the Appendix, however users can enter a colour and predictive text will identify possible options.	
'Fill transparency' This option controls the transparency of the colour of the bars/boxes in box-plots, histograms and means with SEM plots.	
'Line (colour/ black & white)' These options control the colour of the lines used on the non-categorised plots when using the colour or black & white schemes. Colours available are given in the Appendix.	

11 Appendix: InVivoStat colour chart

These are the list of available colours to InVivoStat. A more focussed list is available via predictive test. Users should start to type in the colours for a range of options.


darksalmon
darkseagreen
darkseagreen1
darkseagreen2
darkseagreen3
darkseagreen4
darkslateblue
darkslategray
darkslategray1
darkslategray2
darkslategray3
darkslategray4
darkslategrey
darkturquoise
darkviolet
deeppink
deeppink1
deeppink2
deeppink3
deeppink4
deepskyblue
deepskyblue1
deepskyblue2
deepskyblue3
deepskyblue4
dimgray
dimgrey
dodgerblue
dodgerblue1
dodgerblue2
dodgerblue3
dodgerblue4
firebrick
firebrick1
firebrick2
firebrick3
firebrick4
floralwhite
forestgreen
gainsboro
ghostwhite
gold
gold1
gold2
gold3
gold4
goldenrod
goldenrod1
goldenrod2
goldenrod3
goldenrod4
gray
gray0
gray1
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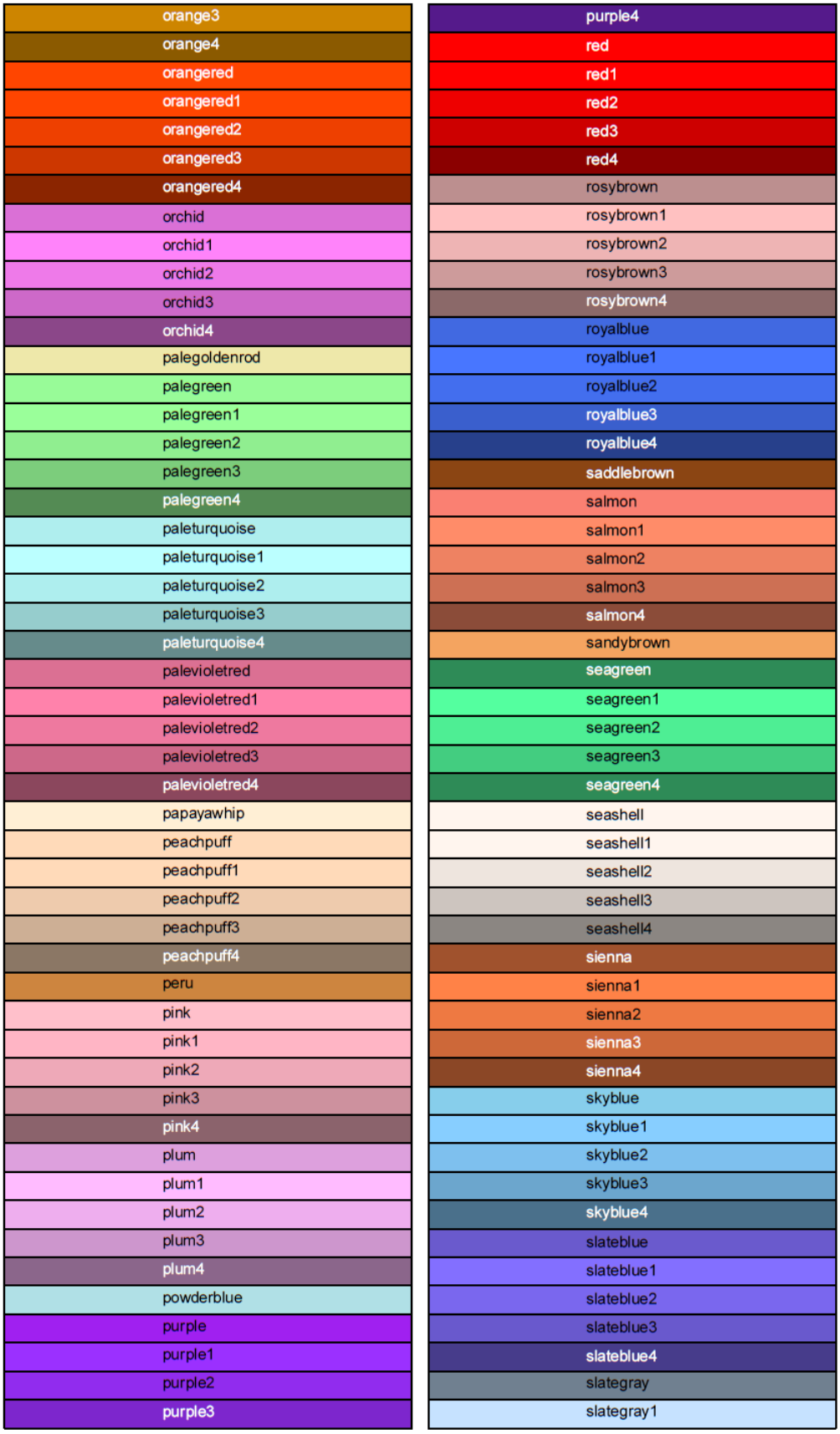
grey95
grey96
grey97
grey98
grey99
grey100
honeydew
honeydew1
honeydew2
honeydew3
honeydew4
hotpink
hotpink1
hotpink2
hotpink3
hotpink4
indianred
indianred1
indianred2
indianred3
indianred4
ivory
ivory1
ivory2
ivory3
ivory4
khaki
khaki1
khaki2
khaki3
khaki4
lavender
lavenderblush
lavenderblush1
lavenderblush2
lavenderblush3
lavenderblush4
lawngreen
lemonchiffon
lemonchiffon1
lemonchiffon2
lemonchiffon3
lemonchiffon4
lightblue
lightblue1


lightblue2
lightblue3
lightblue4
lightcoral
lightcyan
lightcyan1
lightcyan2
lightcyan3
lightcyan4
lightgoldenrod
lightgoldenrod1
lightgoldenrod2
lightgoldenrod3
lightgoldenrod4
lightgoldenrodyellow
lightgray
lightgreen
lightgrey
lightpink
lightpink1
lightpink2
lightpink3
lightpink4
lightsalmon
lightsalmon1
lightsalmon2
lightsalmon3
lightsalmon4
lightseagreen
lightskyblue
lightskyblue1
lightskyblue2
lightskyblue3
lightskyblue4
lightslateblue
lightslategray
lightslategrey
lightsteelblue
lightsteelblue1
lightsteelblue2
lightsteelblue3
lightsteelblue4
lightyellow
lightyellow1
lightyellow2
lightyellow3
lightyellow4
limegreen
linen
magenta
magenta1
magenta2
magenta3
magenta4
maroon
maroon1
maroon2
maroon3
maroon4
mediumaquamarine
mediumblue
mediumorchid
mediumorchid1
mediumorchid2
mediumorchid3
mediumorchid4
mediumpurple
mediumpurple1
mediumpurple2
mediumpurple3
mediumpurple4
mediumseagreen
mediumslateblue
mediumspringgreen
mediumturquoise
mediumvioletred
midnightblue
mintcream
mistyrose
mistyrose1
mistyrose2
mistyrose3
mistyrose4
moccasin
navajowhite
navajowhite1
navajowhite2
navajowhite3
navajowhite4
navy
navyblue
oldlace
olivedrab
olivedrab1
olivedrab2
olivedrab3
olivedrab4
orange
orange1
orange2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orchid3
orchid4
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palegreen
palegreen1
palegreen2
palegreen3
palegreen4
paleturquoise
paleturquoise1
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paleturquoise3
paleturquoise4
palevioletred
palevioletred1
palevioletred2
palevioletred3
palevioletred4
papayawhip
peachpuff
peachpuff1
peachpuff2
peachpuff3
peachpuff4
peru
pink
pink1
pink2
pink3
pink4
plum
plum1
plum2
plum3
plum4
powderblue
purple
purple1
purple2
purple3
purple4
red
red1
red2
red3
red4
rosybrown
rosybrown1
rosybrown2
rosybrown3
rosybrown4
royalblue
royalblue1
royalblue2
royalblue3
royalblue4
saddlebrown
salmon
salmon1
salmon2
salmon3
salmon4
sandybrown
seagreen
seagreen1
seagreen2
seagreen3
seagreen4
seashell
seashell1
seashell2
seashell3
seashell4
sienna
sienna1
sienna2
sienna3
sienna4
skyblue
skyblue1
skyblue2
skyblue3
skyblue4
slateblue
slateblue1
slateblue2
slateblue3
slateblue4
slategray
slategray1

slategray2
slategray3
slategray4
slategrey
snow
snow1
snow2
snow3
snow4
springgreen
springgreen1
springgreen2
springgreen3
springgreen4
steelblue
steelblue1
steelblue2
steelblue3
steelblue4
tan
tan1
tan2
tan3
tan4
thistle
thistle1
thistle2
thistle3
thistle4
tomato
tomato1
tomato2
tomato3
tomato4
turquoise
turquoise1
turquoise2
turquoise3
turquoise4
violet
violetred
violetred1
violetred2
violetred3
violetred4
wheat
wheat1
wheat2
wheat3
wheat4

whitesmoke
yellow
yellow1
yellow2
yellow3
yellow4
yellowgreen