

## Writing Guide – Results and Data Presentation

**Results:** Describe what you found in a paragraph(s) of text that refer to your figures and tables. Figures and tables alone do not make a complete Results section! Your results are the take-home message of what your data say. Use figures or tables to represent important trends or results of your analyses, and be sure these are cited in the textual description. The tables and figures should be placed at the end of the entire document, numbered, in order. Results should be a summary of data and observations; you should not include raw data. The text should summarize what you found, giving means  $\pm$  SE or SD. Tell what happened clearly and concisely without interpretation. Use figures to highlight the main point(s). *Use statistics to make your point, but don't make the statistics your point.* Instead of saying: "We got a p-value of 0.001 meaning our results were significant," say instead "The treatment had significantly more growth than the control, according to a two-tailed t-test ( $t = 0.87$ ,  $df = 1$ ,  $p = 0.001$ )." Explain exactly what the statistical test was testing. Don't just report a Chi-square value and expect the reader to know what you were testing.

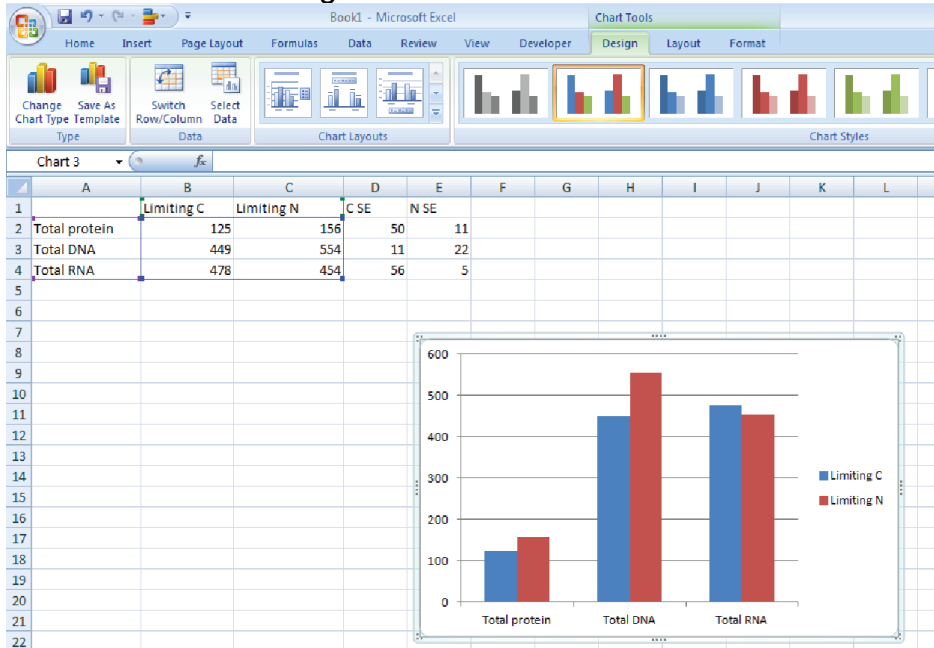
If the results can be described in a graph, these are generally easier to interpret than a table. You should not present the same data in several ways; choose the one best way. Given a choice between table and graph, go for the more visual of the two, e.g. if your table is just going to report means  $\pm$  standard errors (SE), report it graphically. Please note: if you can calculate a mean, then you can calculate the SE. You should always add SE bars to your graph in this case. The default SE bar in Excel is a standard distance away from the mean; this is incorrect, and you will need to enter the correct values. Seek help from your TA if you have never added SE bars to a graph. Figures and tables should be labeled Figure 1 or Table 1 in the order in which they are referred to in the text. Each visual aid should have a descriptive caption (1-2 sentences) explaining what they represent. Captions belong *below* a figure, or *above* a table. Figures and tables can be inserted within the body of the text.

## Data Presentation – Present your summary data visually, preferably in a figure (not a table).

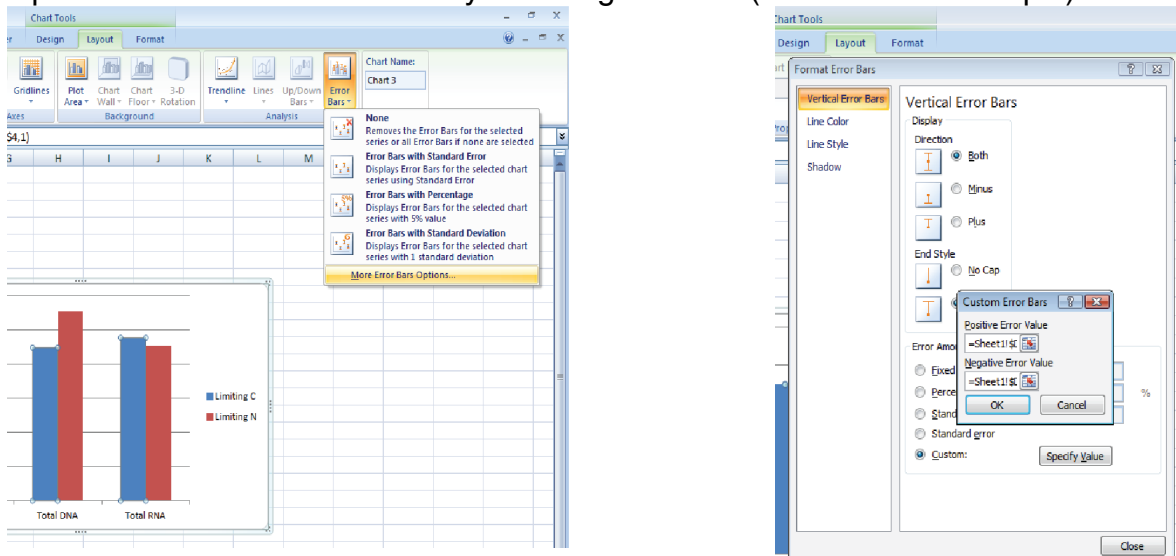
You can learn to do this in R (on your own).

Refer to the following for help creating graphs in Microsoft Excel.

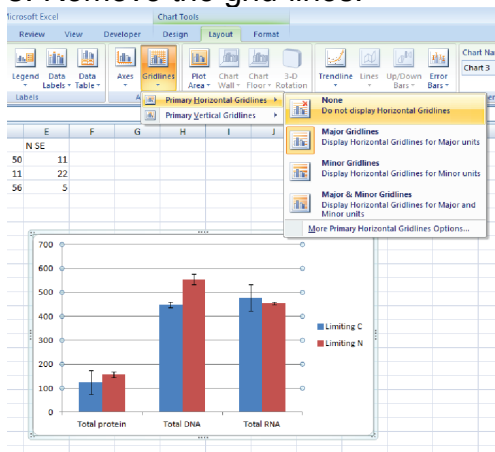
1. Select the data to be graphed and choose the type of graph you wish to use. The graph options can be found under the 'Design' tab.



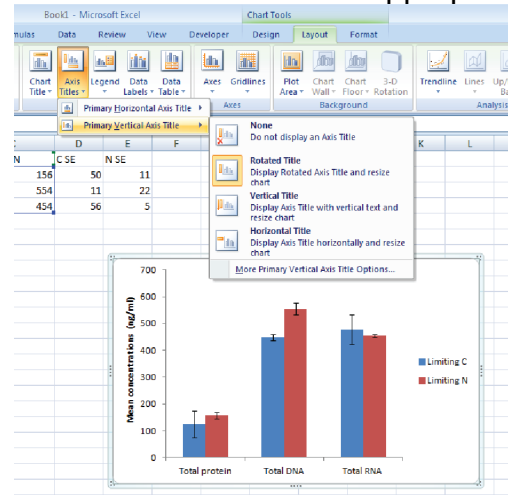
2. Addition of error bars – The option to add error bars can be found under the 'Layout' tab. You can click and select the data series you wish to add the error bars to. On the other hand, you can click on the 'Error Bars' tab and it will ask you to select the data series you wish to add the error bars to. In this example, error bars are being added to the 'Limiting C' data series. Click on the 'More Error Bar Options' and add custom error by selecting the data (C SE in this example).



### 3. Remove the grid-lines.



### 4. Add Axis-Titles where appropriate



### Appropriate Verbs:

- Test (the hypothesis)
- Develop
- Determine
- Provide
- Isolate
- Characterize
- Identify
- Restore
- Implement
- Generate
- Facilitate
- Support

### Some words/things to avoid:

- Starting sentences with This/That/It (it usually isn't clear to what you are referring)
- Appears
- Believe
- Think
- Obviously/clearly (this makes assumptions on what the reader is thinking)
- Very
- Excessive commas (look up the basic comma rules if you don't know them)
- Making statements about absolutes e.g. "X never happens" or "X always happens"
- **Prove or disprove** – Biology is stochastic. There is always the opportunity for chance to change the expected outcome. Thus, we cannot prove or disprove anything.
- Using words in their "common" sense (i.e., their definition outside of science) if those words also have specific scientific or statistical definitions.

**Examples:** significant, correlate, normal, sample, isolate, extract