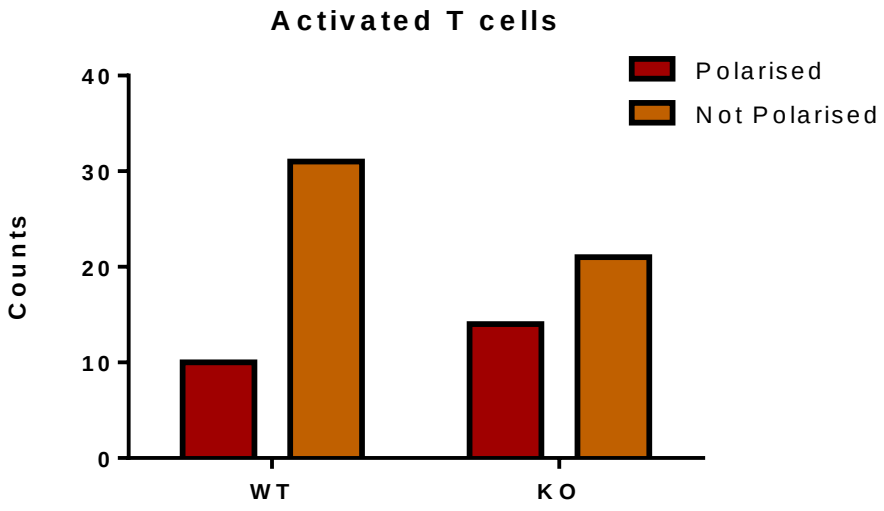
Exercises

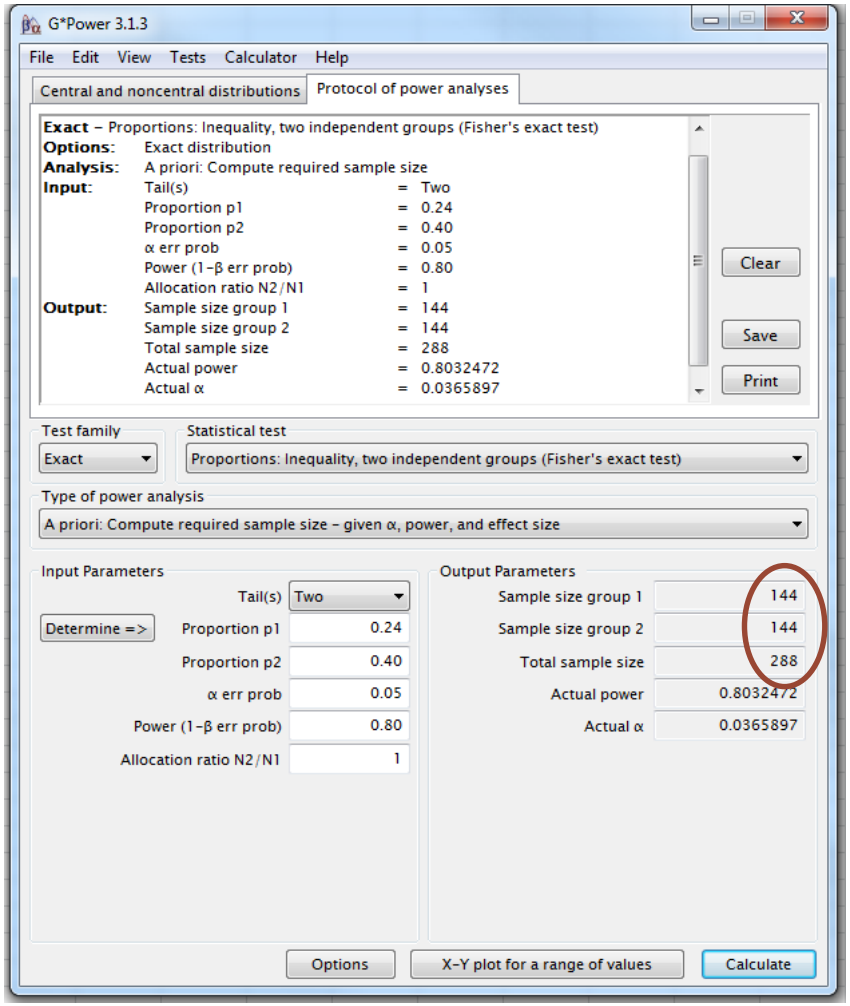
- **Activated T cells**
  - Providing the observed difference between WT and KO cells is of scientific interest, what sample size is needed to achieve a 80% power?
- **Mice weight**
  - What sample size is needed to be able to spot a 10% difference with 80% power?

Exercises

- **Arachnophobia**
  - Is it as scary to look at the picture of a spider than at a real one?
- **Cane toad**
  - Is the proportion of cane toads infected by intestinal parasites the same in 3 different areas of Queensland?
- **Neutrophils**
  - Is there a difference between KO with/without treatment and WT?

Activated T cells

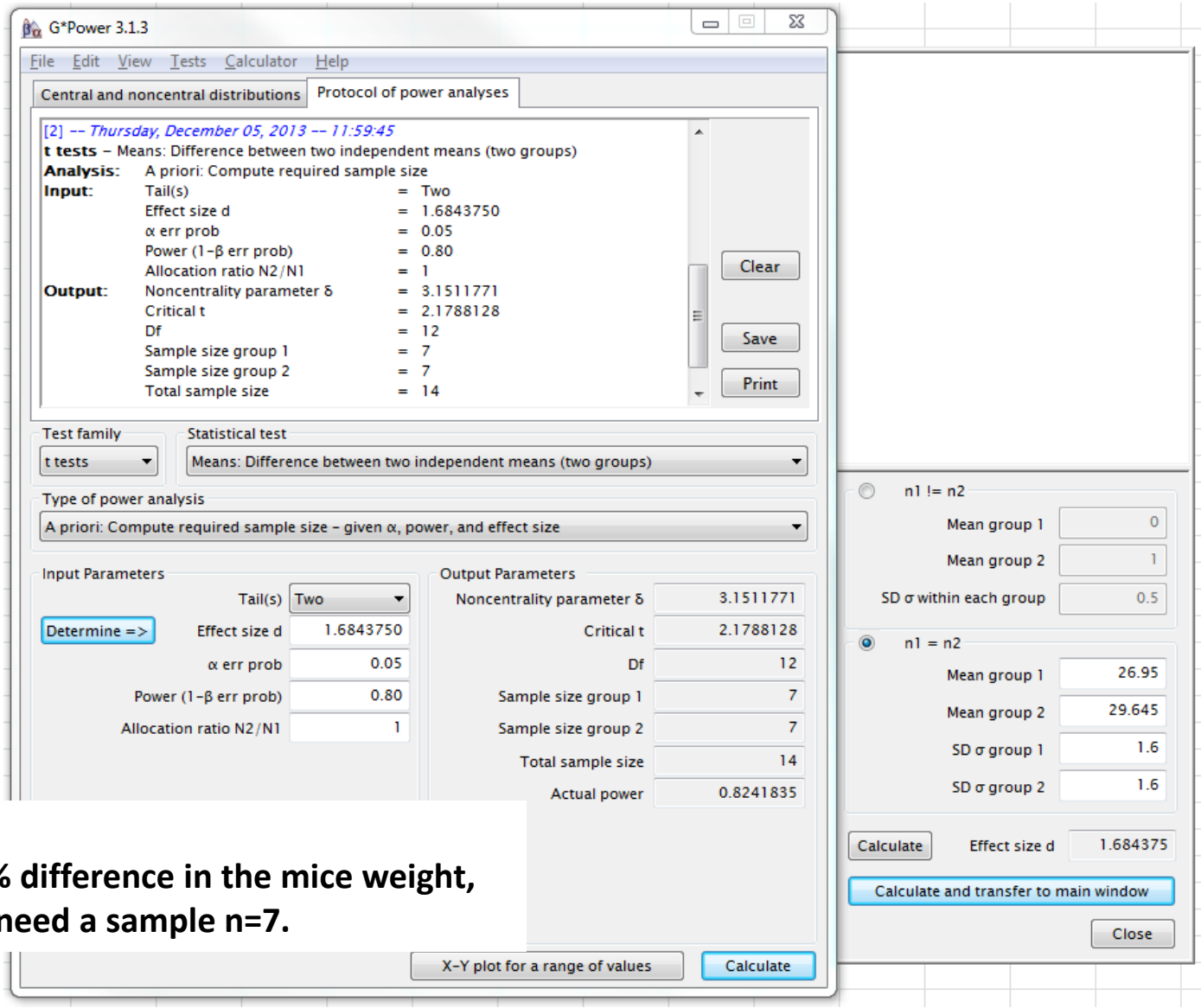




Answer:
To achieve a power of 80%,
you will need a total sample of 288 cells.

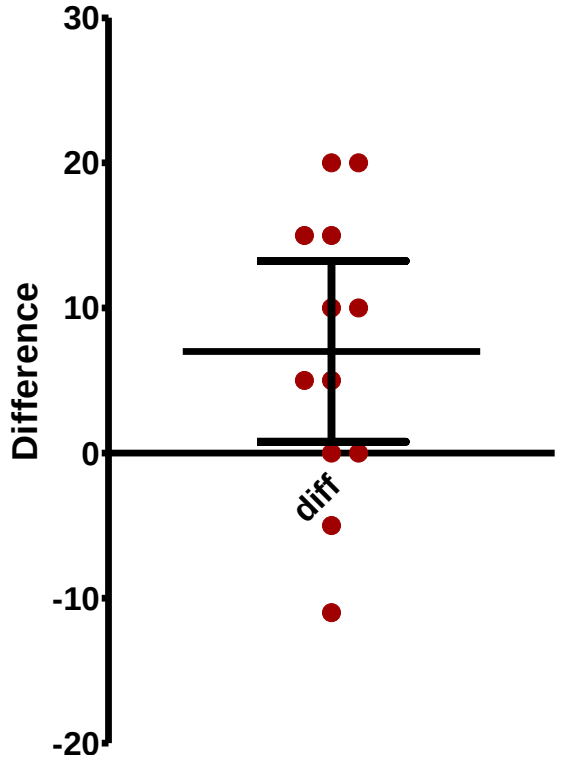
Mice weight

Weight
27.2
25.5
26
29.1
26.95
1.601041



Answer:
To be able to spot a 10% difference in the mice weight, at 80% power, you will need a sample n=7.

Arachnophobia



1	Table Analyzed	Archnophobia
2	Column A	Picture
3	vs	vs
4	Column B	Real Spider
5		
6	Paired t test	
7	P value	0.0310
8	P value summary	*
9	Are means signif. different? (P < 0.05)	Yes
10	One- or two-tailed P value?	Two-tailed
11	t, df	t=2.473 df=11
12	Number of pairs	12
13		
14	How big is the difference?	
15	Mean of differences	-7.000
16	95% confidence interval	-13.23 to -0.7687
17	R squared	0.3572
18		
19	How effective was the pairing?	
20	Correlation coefficient (r)	0.5455
21	P Value (one tailed)	0.0333
22	P value summary	*
23	Was the pairing significantly effective?	Yes
24		

Col. stats

		Picture	Real Spider	diff
		Y	Y	Y
1	Number of values	12	12	12
2				
3	Minimum	25.00	30.00	-11.00
4	25% Percentile	31.25	36.00	0.0
5	Median	40.00	50.00	7.500
6	75% Percentile	48.75	55.00	15.00
7	Maximum	55.00	65.00	20.00
8				
9	Mean	40.00	47.00	7.000
10	Std. Deviation	9.293	11.03	9.807
11	Std. Error	2.683	3.184	2.831
12				
13	Lower 95% CI of mean	34.10	39.99	0.7689
14	Upper 95% CI of mean	45.90	54.01	13.23
15				
16	D'Agostino & Pearson omnibus normality t			
17	K2	0.7251	1.060	0.5115
18	P value	0.6924	0.5886	0.7744
19	Passed normality test (alpha=0.05)?	Yes	Yes	Yes
20	P value summary	ns	ns	ns
21				
22	Sum	480.0	564.0	84.00

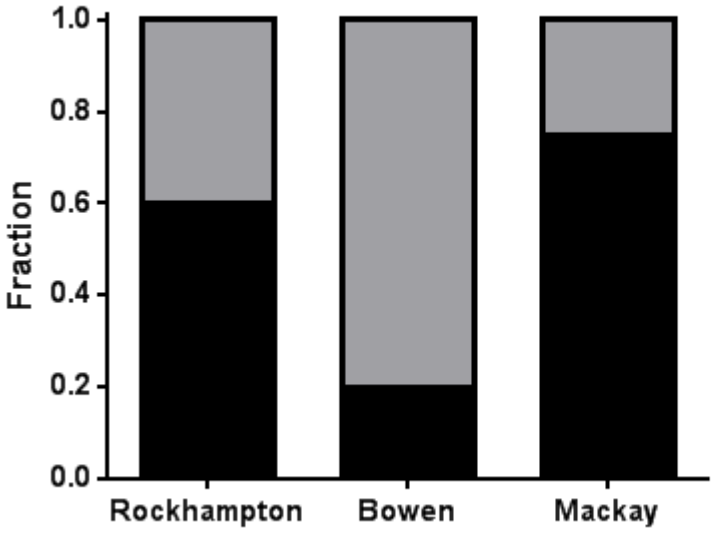
1	Table Analyzed	Archnophobia
2	Column A	Picture
3	vs	vs
4	Column B	Real Spider
5		
6	Unpaired t test	
7	P value	0.1068
8	P value summary	ns
9	Are means signif. different? (P < 0.05)	No
10	One- or two-tailed P value?	Two-tailed
11	t, df	t=1.681 df=22
12		
13	How big is the difference?	
14	Mean ± SEM of column A	40.00 ± 2.683 N=12
15	Mean ± SEM of column B	47.00 ± 3.184 N=12
16	Difference between means	-7.000 ± 4.163
17	95% confidence interval	-15.63 to 1.635
18	R squared	0.1139
19		
20	F test to compare variances	
21	F,DFn, Dfd	1.408, 11, 11
22	P value	0.5797
23	P value summary	ns
24	Are variances significantly different?	No

Answer:

If you are arachnophobe, it is scarier to look at a real spider than at the picture of one (p=0.0310).

Cane toad

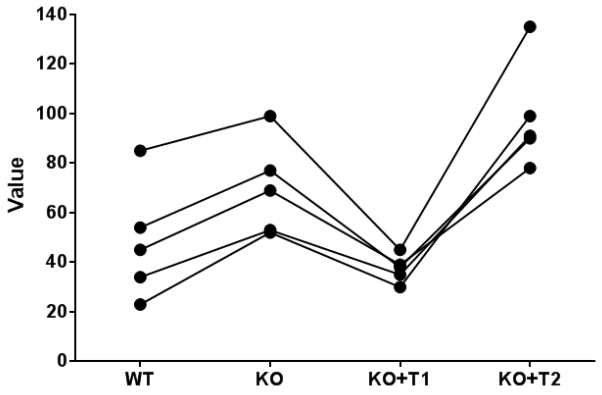
Table Analyzed	Cane toad
Chi-square	
Chi-square, df	12.95, 2
P value	0.0015
P value summary	*
One- or two-tailed	NA
Statistically significant? (alpha<0.05)	Yes
Data analyzed	
Number of rows	3
Number of columns	2

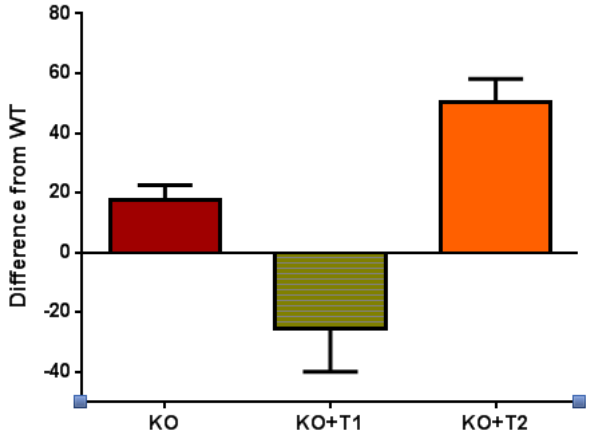


Answer:

The proportion of cane toads infected by intestinal parasites varies significantly between the 3 different areas of Queensland (p=0.0015), the animals being more likely to be parasitized in Rockhampton and Mackay than in Bowen.

Neutrophils





1	Table Analyzed	Repeated measures one-way ANOVA data2			
2					
3	Repeated measures ANOVA summary				
4	Assume sphericity?	No			
5	F	28.57			
6	P value	0.0002			
7	P value summary	***			
8	Statistically significant (P < 0.05)?	Yes			
9	Geisser-Greenhouse's epsilon	0.6916			
10	R square	0.8772			
11					
12	Was the matching effective?				
13	F	8.239			
14	P value	0.0020			
15	P value summary	**			
16	Is there significant matching (P < 0.05)?	Yes			
17	R square	0.2522			
18					
19	ANOVA table	SS	DF	MS	F (DFn, DFd)	P value
20	Treatment (between columns)	10948	3	3649	F (2.075, 8.299) = 28.57	P = 0.0002
21	Individual (between rows)	4209	4	1052	F (4, 12) = 8.239	P = 0.0020
22	Residual (random)	1533	12	127.7		
23	Total	16689	19			

Dunnett's multiple comparisons test	Mean Diff.	95% CI of diff.	Significant?	Summary	Adjusted P Value	A-?	
WT vs. KO	-21.80	-30.91 to -12.69	Yes	**	0.0022	B	KO
WT vs. KO+T1	10.80	-19.02 to 40.62	No	ns	0.4941	C	KO+T1
WT vs. KO+T2	-50.40	-78.53 to -22.27	Yes	**	0.0067	D	KO+T2

Answer:

There is a significant difference from WT for the first and third groups.