BASIC CONCEPTS – week 2

USING SAS PROCEDURES
* Introduce the idea of SAS system options
* Briefly review statements that can be used with most procedures (BY, WHERE, TITLE, FOOTNOTE, LABEL, FORMAT)
* PROC CONTENTS for describing a data set
* PROC PRINT for listing the observations in a data set
* PROC CHART and PROC PLOT for producing low resolution graphs
* PROC FREQ for one-way frequency tables and n-way cross-tabulations
* PROC UNIVARIATE for descriptive statistics and distributional information
* PROC MEANS for descriptive statistics
* PROC SORT for sorting a data set
* SAS documentation and the online help system

SAS system options

* options in place for the life of a program – in place for all DATA and PROC steps in a SAS job or session unless respecified in another “options” statement.

* commonly used: center/ nocenter; date/nodate; ls (line size or printer line width); macro/nomacro (whether or not macro language is available); macrogen/nomacrogen (statements generated by MACRO printed or not); formdlim (defines breaks in a output panel)

options(ls=75, nocenter)

Statements that can be used with most procedures (BY, WHERE, TITLE, FOOTNOTE, LABEL, FORMAT)

BY = conduct analyses by levels of one or more variables
WHERE = subset data for use in a procedure

TITLE = place title at top of every page

FOOTNOTE = place note at bottom of every page

LABEL = attach meaningful text descriptions to variables in data set

FORMAT = expand on values of variables – associates formats with variables in a DATA step.

/*
EXAMPLE 1: Format in DATA step vs. PROC – Try it!
*/
data d1;
  input x y @@;
  format y dollar6.2;
  datalines;
  1 2 4 3 5 6
;  
proc print;
title "Y formatted in DATA";
  run;
proc print;
title2 "X now formatted in the 2nd PROC PRINT";
  format x dollar4.;
  run;

EXAMPLE 2.2: PROC FORMAT
proc format;
  value totfmt 0='none'
                 1-HIGH='some'
;  
data cdubia_young;
infile "\Muserver2\USERS\B\BAILERAJ\public.www\classes\sta402\SAS-programs\ch2-dat.txt" firstobs=16 expandtabs missover pad ;
infile 'M:\public.www\classes\sta402\SAS-programs\ch2-dat.txt' firstobs=16 expandtabs missover pad ;

input @9 animal 2.
   @17 conc 3.
   @25 brood1 2.
   @33 brood2 2.
   @41 brood3 2.
   @49 total 2.;

cbrood3 = brood3;
format cbrood3 totfmt.;

label animal = animal ID number;
label conc = Nitrofen concentration;
label brood1 = number of young in first brood;
label brood2 = number of young in 2nd brood;
label brood3 = number of young in 3rd brood;
label total = total young produced in three broods;

proc print;
   where conc=0;
run;

PROC CONTENTS for describing a data set

proc contents; run;

The CONTENTS Procedure

- Data Set Name: WORK.CDUBIA_YOUNG
- Member Type: DATA
- Engine: V9
- Created: Friday, August 24, 2007 07:44:11 AM
- Last Modified: Friday, August 24, 2007 07:44:11 AM
- Observations: 50
- Variables: 7
- Indexes: 0
- Observation Length: 56
- Deleted Observations: 0
- Compressed: NO
- Sorted: NO
PROC PRINT for listing the observations in a data set

proc print;
  by conc;       * assumes input data sorted by this variable;
  sum total;
  id animal;    * uses animal instead of observation number to ID case;
run;

Nitrofen concentration=0

animal  brood1  brood2  brood3  total  cbrood3
       1       3       14       10      27      some
       2       5       12       15      32      some
       3       6       11       17      34      some
       4       6       12       15      33      some
       5       6       15       15      36      some
       6       5       14       15      34      some
       7       6       12       15      33      some
       8       5       13       12      30      some
       9       3       10       11      24      some
      10       6       11       14      31      some

---

conc  314
/* some output cut out here */

Nitrofen concentration=310

<table>
<thead>
<tr>
<th>animal</th>
<th>brood1</th>
<th>brood2</th>
<th>brood3</th>
<th>total</th>
<th>cbrood3</th>
</tr>
</thead>
<tbody>
<tr>
<td>41</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>none</td>
</tr>
<tr>
<td>42</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>none</td>
</tr>
<tr>
<td>43</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>none</td>
</tr>
<tr>
<td>44</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>none</td>
</tr>
<tr>
<td>45</td>
<td>5</td>
<td>10</td>
<td>0</td>
<td>15</td>
<td>none</td>
</tr>
<tr>
<td>46</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>none</td>
</tr>
<tr>
<td>47</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>none</td>
</tr>
<tr>
<td>48</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>none</td>
</tr>
<tr>
<td>49</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>none</td>
</tr>
<tr>
<td>50</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>none</td>
</tr>
</tbody>
</table>

......

conc 60

===

1144

PROC CHART and PROC PLOT for producing low resolution graphs

proc chart;
   hbar total / subgroup=conc;
   * vbar total / subgroup=conc; * if vertical bars desired;
   run;

proc chart;
   hbar total / group=conc;
   run;
<table>
<thead>
<tr>
<th>Midpoint</th>
<th>total young produced in three broods</th>
<th>Cum. Freq</th>
<th>Cum. Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>18</td>
<td></td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>24</td>
<td>*****</td>
<td>1</td>
<td>2.00</td>
</tr>
<tr>
<td>30</td>
<td>**********************************</td>
<td>4</td>
<td>8.00</td>
</tr>
<tr>
<td>36</td>
<td>**********************************</td>
<td>5</td>
<td>10.00</td>
</tr>
<tr>
<td>80</td>
<td>0</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>18</td>
<td></td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>24</td>
<td>*****</td>
<td>1</td>
<td>2.00</td>
</tr>
<tr>
<td>30</td>
<td>**********************************</td>
<td>4</td>
<td>8.00</td>
</tr>
<tr>
<td>36</td>
<td>**********************************</td>
<td>5</td>
<td>10.00</td>
</tr>
<tr>
<td>160</td>
<td>0</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>18</td>
<td></td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>24</td>
<td>*****</td>
<td>1</td>
<td>2.00</td>
</tr>
<tr>
<td>30</td>
<td>**********************************</td>
<td>4</td>
<td>8.00</td>
</tr>
<tr>
<td>36</td>
<td>**********************************</td>
<td>5</td>
<td>10.00</td>
</tr>
<tr>
<td>235</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>*****</td>
<td>1</td>
<td>2.00</td>
</tr>
<tr>
<td>12</td>
<td>**********************************</td>
<td>3</td>
<td>6.00</td>
</tr>
<tr>
<td>18</td>
<td></td>
<td>1</td>
<td>2.00</td>
</tr>
<tr>
<td>24</td>
<td></td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>30</td>
<td></td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>36</td>
<td></td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>310</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>**********************************</td>
<td>1</td>
<td>2.00</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>8</td>
<td>16.00</td>
</tr>
<tr>
<td>18</td>
<td></td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>24</td>
<td></td>
<td>1</td>
<td>2.00</td>
</tr>
<tr>
<td>30</td>
<td></td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>36</td>
<td></td>
<td>0</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Frequency

```plaintext
options ls=74;
proc plot;
  plot total*conc=cbrood3 / vaxis=0 to 40 by 2;
run;
```
Plot of total conc. Symbol is value of cbrood3.

Nitrofen concentration

NOTE: 13 obs hidden.

proc plot;
plot brood1*conc="1" brood2*conc="2" brood3*conc="3" / overlay vaxis=0 to 20 by 2;
run;
Plot of brood1*conc.  Symbol used is '1'.
Plot of brood2*conc.  Symbol used is '2'.
Plot of brood3*conc.  Symbol used is '3'.

18 ˆ 3
num 3
b 16 3
er 2 3
o 14 2 3
f 2 2 2 2
y 12 2 2 2
u 2 2 2
g 10 2 2 2 2
i 2
n 2 3 2
f 1 2 2
r 1 1 1 1
s 1 1 1 1 1
b 1 1 1 2 1
r 1 1
o 1 1
2
0

NOTE: 103 obs hidden.

* add jitter to the concentration for plotting;
Data d3; set d1;
    jconc = conc + 20*ranuni(0) - 10;
proc plot;
    plot brood1*jconc="1" brood2*jconc="2" brood3*jconc="3" /
        overlay vaxis=0 to 20 by 2;
run;
NOTE: 63 obs hidden
proc freq;
    table conc*cbrood3 / nopct nocol chisq trend exact;
run;

The FREQ Procedure

Table of conc by cbrood3

conc (Nitrofen concentration)
    cbrood3
Frequency,
Row Pct    none    some    Total

0          0        10       10
  0.00     100.00

80         0        10       10
  0.00     100.00

160        0        10       10
  0.00     100.00

235        1        9        10
 10.00     90.00

310        10       0        10
100.00     0.00

Total: 11       39       50

Statistics for Table of conc by cbrood3

Statistic                  DF     Value      Prob

Chi-Square                  4     44.7552    <.0001
Likelihood Ratio Chi-Square 4     46.1891    <.0001
Mantel-Haenszel Chi-Square  1     24.5782    <.0001
Phi Coefficient                     0.9461
Contingency Coefficient             0.6873
Cramer's V                         0.9461

WARNING: 50% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Fisher's Exact Test

Table Probability (P)  2.677E-10
Pr <= P  5.354E-09

Cochran-Armitage Trend Test

Statistic (Z)  5.0080
One-sided Pr > Z  <.0001
Two-sided Pr > |Z|  <.0001

Sample Size = 50
proc univariate plot; by conc;
   var total;
   ID variable_name_of_interest;
run;

Nitrofen concentration=0  (notice that the LABEL used here!)

The UNIVARIATE Procedure
Variable: total  (total young produced in three broods)

Moments

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>10</td>
<td>Sum Weights</td>
<td>10</td>
</tr>
<tr>
<td>Mean</td>
<td>31.4</td>
<td>Sum Observations</td>
<td>314</td>
</tr>
<tr>
<td>Std Deviation</td>
<td>3.59629439</td>
<td>Variance</td>
<td>12.9333333</td>
</tr>
<tr>
<td>Skewness</td>
<td>-1.0520566</td>
<td>Kurtosis</td>
<td>0.78817014</td>
</tr>
<tr>
<td>Uncorrected SS</td>
<td>9976</td>
<td>Corrected SS</td>
<td>116.4</td>
</tr>
<tr>
<td>Coeff Variation</td>
<td>11.4531668</td>
<td>Std Error Mean</td>
<td>1.13724814</td>
</tr>
</tbody>
</table>

Basic Statistical Measures

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td></td>
<td>Variability</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>31.4</td>
<td>Std Deviation</td>
<td>3.59629</td>
</tr>
<tr>
<td>Median</td>
<td>32.5</td>
<td>Variance</td>
<td>12.9333333</td>
</tr>
<tr>
<td>Mode</td>
<td>33.0</td>
<td>Range</td>
<td>12.00000</td>
</tr>
<tr>
<td>Interquartile Range</td>
<td>4.00000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE: The mode displayed is the smallest of 2 modes with a count of 2.

Tests for Location: Mu0=0

<table>
<thead>
<tr>
<th>Test</th>
<th>-Statistic-</th>
<th>-----p Value------</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student's t</td>
<td>t 27.61051</td>
<td>Pr &gt;</td>
</tr>
<tr>
<td>Sign</td>
<td>M 5</td>
<td>Pr &gt;=</td>
</tr>
<tr>
<td>Signed Rank</td>
<td>S 27.5</td>
<td>Pr &gt;=</td>
</tr>
</tbody>
</table>

Quantiles (Definition 5)

<table>
<thead>
<tr>
<th>Quantile</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>100% Max</td>
<td>36.0</td>
</tr>
<tr>
<td>99%</td>
<td>36.0</td>
</tr>
<tr>
<td>95%</td>
<td>36.0</td>
</tr>
<tr>
<td>90%</td>
<td>35.0</td>
</tr>
<tr>
<td>75% Q3</td>
<td>34.0</td>
</tr>
<tr>
<td>50% Median</td>
<td>32.5</td>
</tr>
<tr>
<td>25% Q1</td>
<td>30.0</td>
</tr>
<tr>
<td>10%</td>
<td>25.5</td>
</tr>
<tr>
<td>5%</td>
<td>24.0</td>
</tr>
<tr>
<td>1%</td>
<td>24.0</td>
</tr>
<tr>
<td>0% Min</td>
<td>24.0</td>
</tr>
</tbody>
</table>

Nitrofen concentration=0

The UNIVARIATE Procedure
Variable: total  (total young produced in three broods)

Extreme Observations

----Lowest----    ----Highest----
<table>
<thead>
<tr>
<th>Value</th>
<th>Obs</th>
<th>Value</th>
<th>Obs</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>9</td>
<td>33</td>
<td>4</td>
</tr>
<tr>
<td>27</td>
<td>1</td>
<td>33</td>
<td>7</td>
</tr>
<tr>
<td>30</td>
<td>8</td>
<td>34</td>
<td>3</td>
</tr>
<tr>
<td>31</td>
<td>10</td>
<td>34</td>
<td>6</td>
</tr>
<tr>
<td>32</td>
<td>2</td>
<td>36</td>
<td>5</td>
</tr>
</tbody>
</table>

Stem Leaf # Boxplot
36 0 1
34 00 2 +-----+
32 000 3 *------*
30 00 2 +-----+
28 26 0 1 |
24 0 1

Normal Probability Plot
37+ +++++
31+ *+++++
25+ *+++++
---+---+---+---+---+---+---+---+---+---+
-2 -1 0 +1 +2

/* some output cut out here */
The UNIVARIATE Procedure
Variable: total  (total young produced in three broods)

Schematic Plots

PROC MEANS for descriptive statistics

proc means maxdec=2; by conc;
   var total;
run;

Nitrofen concentration=0
The MEANS Procedure
   Analysis Variable : total total young produced in three broods

<table>
<thead>
<tr>
<th>N</th>
<th>Mean</th>
<th>Std Dev</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>31.40</td>
<td>3.60</td>
<td>24.00</td>
<td>36.00</td>
</tr>
</tbody>
</table>

Nitrofen concentration=80
Analysis Variable : total total young produced in three broods

<table>
<thead>
<tr>
<th>N</th>
<th>Mean</th>
<th>Std Dev</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>31.50</td>
<td>3.27</td>
<td>26.00</td>
<td>36.00</td>
</tr>
</tbody>
</table>
Nitrofen concentration=160
Analysis Variable : total total young produced in three broods

<table>
<thead>
<tr>
<th>N</th>
<th>Mean</th>
<th>Std Dev</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>28.30</td>
<td>2.36</td>
<td>23.00</td>
<td>31.00</td>
</tr>
</tbody>
</table>

Nitrofen concentration=235
Analysis Variable : total total young produced in three broods

<table>
<thead>
<tr>
<th>N</th>
<th>Mean</th>
<th>Std Dev</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>17.20</td>
<td>5.90</td>
<td>7.00</td>
<td>27.00</td>
</tr>
</tbody>
</table>

Nitrofen concentration=310
Analysis Variable : total total young produced in three broods

<table>
<thead>
<tr>
<th>N</th>
<th>Mean</th>
<th>Std Dev</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>6.00</td>
<td>3.71</td>
<td>0.00</td>
<td>15.00</td>
</tr>
</tbody>
</table>

**PROC SORT for sorting a data set**

```sas
proc sort data=d1 out=d2; by conc;
proc print data=d2; by conc;
run;
```

* note: SAS uses the most recently created data set as a default – so better to use “data=” as a habit to avoid occasional surprises.

* can sort by more than one variable – for example

```sas
proc sort data=data_in out=data_out; by ROOM NAME;
```

would sort first by ROOM and then by NAME within ROOM

;/*
Sorting example – Try it!
*/

```sas
options formdlim="-";
data dsort;
  input charvar $ numvar response @@;
datalines;
A 2 11 a 1 12 A 1 10
```
data dsort;
  input charvar $ numvar response @@;
 datalines;
 A 2 11 A 1 12 A 1 10
 B 2 21 B 2 22 B 3 20
;
 proc print;
   run;
 proc sort data=dsort; by charvar;
 proc print;
 title "Sorted by CHARVAR'';
   run;
 proc sort data=dsort out=ncsort; by numvar charvar;
 proc print;
 title "Sorted by NUMVAR CHARVAR'';
   run;
 proc sort data=dsort out=ncsort; by numvar charvar;
 proc print;
 title "Sorted by NUMVAR CHARVAR'';
   run;
 proc sort data=dsort out=ncsort; by numvar charvar;
 proc print;
 title "Sorted by NUMVAR CHARVAR'';
   run;
proc sort data=dsort; by numvar charvar;
proc print;
title “Sorted by NUMVAR CHARVAR”;
run;

SAS documentation and the online help system

* HELP menu option

* book icon on the command bar

* type “help” in the command window (top left in Windows SAS by the check mark)

* Recall that access is available via the web www.muohio.edu/quantapps

> SAS system > SAS OnlineDoc on the Web®, Version 9.1.3
(check out “Base SAS” and “SAS/STAT” – “SAS/GRAPH” and “SAS/IML” will also be of some interest to you; “Base SAS” include link to MACRO)

See if you can find the documentation for some of the PROCs we used above.

/*
   Recoding categorical variables using IF-THEN or BOOLEAN operations
*/
iEnglish = 1 lang="English"
   = 0 otherwise

* option 1;
if lang="English" then iEnglish = 1;
   else iEnglish = 0;

* option 2;
iEnglish = (lang="English");

SES = 1 "low" =2 "med" =3 "high"
* option i;
if SES="low" then cSES = 1;
   else if SES="med" then cSES=2;
   else cSES=3;

* option ii;
if SES="low" then cSES = 1;
if SES="med" then cSES = 2;
if SES="high" then cSES = 3;

* option iii;
cSES = 1*(SES="low") + 2*(SES="med") + 3*(SES="high");
* you can have more than one title in a program

```sas
proc format;
  value totfmt     0='none'
                  1-HIGH='some'
;
data d1;
  title "Reproductive Toxicity Study of Nitrofen in C. dubia";
  footnote "Data previously analyzed by Bailer and Oris (1993)"
  infile '\Muserver2\USERS\B\baileraj\public.www\classes\sta402\SAS-programs\ch2-dat.txt' firstobs=16 expandtabs missover pad ;
  input @9 animal 2.
      @17 conc 3.
      @25 brood1 2.
      @33 brood2 2.
      @41 brood3 2.
      @49 total 2.;
  cbrood3 = brood3;
  format cbrood3 totfmt.;
  label animal = animal ID number;
  label conc = Nitrofen concentration;
  label brood1 = number of young in first brood;
  label brood2 = number of young in 2nd brood;
  label brood3 = number of young in 3rd brood;
  label total = total young produced in three broods;
  options pageno=1 nodate;

Data d3; set d1;
  jconc = conc + 20*ranuni(0) - 10;
  jbrood1 = brood1 + 2*ranuni(0) -1;
  jbrood2 = brood2 + 2*ranuni(0) -1;
  jbrood3 = brood3 + 2*ranuni(0) -1;

  * add jitter to the concentration for plotting;
  * add jitter to the counts as well;

proc plot;
  title2 'Plot of Brood counts vs. Nitrofen concentration'
  title3 '[points jittered in both x and y directions]' ;
  plot jbrood1*jconc="1" jbrood2*jconc="2" jbrood3*jconc="3" / overlay vaxis=0 to 20 by 2;
  run;

proc plot;
  title2 'Plot of Brood 1 young produced vs. concentration'
  plot jbrood1*jconc="1" / vaxis=0 to 20 by 2;
  run;
```
proc plot;
title2 'Plot of Brood 2 young produced vs. concentration';
   plot jbrood2*jconc="2" / vaxis=0 to 20 by 2;
run;

proc plot;
title2 'Plot of Brood 3 young produced vs. concentration';
   plot jbrood3*jconc="3" / vaxis=0 to 20 by 2;
run;

/* output follows */
Reproductive Toxicity Study of Nitrofen in C. dubia

Plot of Brood counts vs. Nitrofen concentration
[points jittered in both x and y directions]

Plot of jbrood1*jconc. Symbol used is '1'.
Plot of jbrood2*jconc. Symbol used is '2'.
Plot of jbrood3*jconc. Symbol used is '3'.

jbrood1
20
18
16
14
12
10
8
6
4
2
jconc

jbrood2

jbrood3

NOTE: 31 obs hidden.

Data previously analyzed by Bailer and Oris (1993)
Reproductive Toxicity Study of Nitrofen in C. dubia

Plot of Brood 1 young produced vs. concentration

Plot of jbrood1*jconc. Symbol used is '1'.

NOTE: 5 obs hidden.

Data previously analyzed by Bailer and Oris (1993)
Reproductive Toxicity Study of Nitrofen in C. dubia

Plot of Brood 2 young produced vs. concentration

Plot of jbrood2*jconc. Symbol used is '2'.

jbrood2, jconc

NOTE: 4 obs hidden. 6 obs out of range.

Data previously analyzed by Bailer and Oris (1993)
Reproductive Toxicity Study of Nitrofen in C. dubia

Plot of Brood 3 young produced vs. concentration

Plot of jbrood3*jconc. Symbol used is '3'.

NOTE: 4 obs hidden. 6 obs out of range.

Data previously analyzed by Bailer and Oris (1993)
How about multiple plots per page?

```
proc plot hpercent=50 vpercent=50;
  plot jbrood1*jconc="1" jbrood2*jconc="2" jbrood3*jconc="3" total*jconc / 
    haxis = 0 to 400 by 100;
run;
```

Reproductive Toxicity Study of Nitrofen in C. dubia

Plot of Brood 3 young produced vs. concentration

(Notice that TITLE and TITLE2 carried over from previous declaration)

Plot of jbrood1*jconc. Symbol used is '1'.

Plot of jbrood2*jconc. Symbol used is '2'.

Plot of jbrood3*jconc. Symbol used is '3'.

Plot of total*jconc. Symbol used is 'A'.

Data previously analyzed by Bailer and Oris (1993)