# SOF-710
# ANIMAL FOOD INTAKE MONITOR

USER'S MANUAL

**DOC-166**
**SOF-710 USER'S MANUAL**
**Rev. 1.1**



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**Table of Contents**

# CHAPTER 1
## *General Information*

### General Computer Environment

The minimum recommended system is as follows:

- Windows 2000, Windows XP, or Windows 7

### Installing the DIG-704 Interface Card

Always turn off the power before working on the computer or chambers. Neglecting this precaution may cause serious damage. If a DIG-704 PCI card is being used, install the DIG-704 card according to the instructions provided with the computer for installing a PCI card.

### Installing Drivers and Software

Prior to installing the software, the necessary drivers must be installed on the computer. Insert the Animal Monitor CD into the CD-ROM drive and the screen shown in Figure 1.1 should appear. If it does not, browse to the CD-ROM drive containing the Animal Monitor CD and open the file named autorun.exe.

*Figure 1.1 - Animal Monitor Main Menu*


From the screen shown in Figure 1.1, select the type of DIG-704 device being used, and then follow the instructions to install the device drivers. Once all of the necessary drivers have been installed, select **To install Animal Monitor click here**.

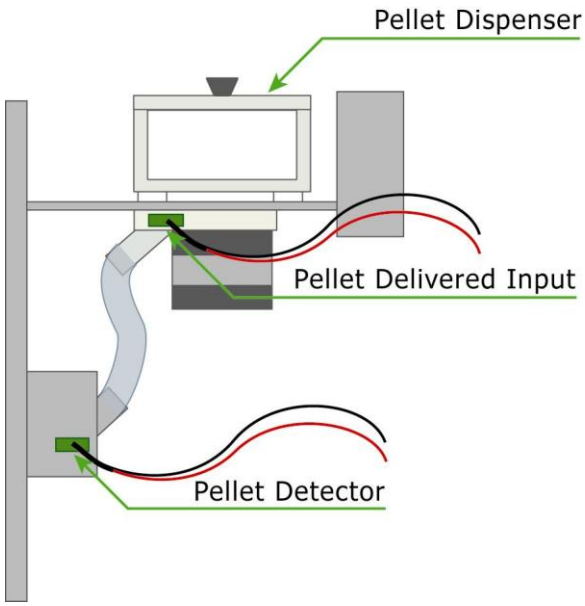
## Backing Up Software

Making a backup copy of any data files created by Animal Monitor is strongly advised.

## Connecting the Animal Monitor Chambers

Connect each house light to any available Output on a standard MED Connection Panel. The Pellet Receptacle(s) being used must have the Built-in Infrared Sentry in order to detect that a pellet has been taken. Refer to the hardware sheets that were included with the pellet dispenser and pellet receptacle for wiring instructions.

*Figure 1.2 - Hardware Labeled*



# CHAPTER 2
## *Getting Started*

### General Software Information

Animal Monitor is designed to monitor an animal's eating habits over a long period of time. The program is designed to work with standard pellet dispensers. When the program detects that a pellet has been taken the time is recorded and another pellet is dispensed. The information gathered from the dispensing of each pellet is used to determine the beginning of each meal, the duration of the meal, the amount of food eaten during the meal, and the amount of time between each meal. The program also calculates the average size of the meals, the average meal duration, and the average Inter-Meal Interval. Various configuration options allow the user to decide what criteria the program will use to determine when a meal has stopped and/or started.

Animal Monitor allows the user to break the data down into multiple Phases. For example, if the experiment will last for one week, one could have a Phase for each day, every 12 hours, and the entire week. The program requires that there be one Phase named "Day", which is used to determine when the house light should be turned on or off. The number of hours in the Day phase is user defined. This allows one to test what affect a longer or shorter Day cycle might have on an animal's eating patterns.

Each Phase should be considered a mini experiment and all Phases are running at all times. When a 12-hour Phase has completed, the data for that Phase is saved and a new 12-hour Phase is immediately started. The same is true for the Day Phase and any other Phases that may have been created. Data from one Phase does not run over into the next Phase. So if a meal ends and 10 minutes later the Phase ends, the next meal starts in the new Phase and there is no Inter-Meal Interval calculated. The only exception is if a meal crosses the ending and beginning of a Phase, all of that meals data is counted in the Phase that it began in. This essentially extends the length of that one Phase.

The program saves the raw data (the times that each pellet was dispensed) into a ".RAW.CSV" file and the calculated data into a ".CSV" file. Both files are based on Subject, Experiment, and Group. So if the Subject was "Subj 1," the Experiment was "Exp 1," and the Group was "Grp 1" the raw data would be saved in a file called:

Subject_Subj 1_Experiment_Exp 1.Group_Grp 1.raw.csv

and the calculated data would be saved in a file called:

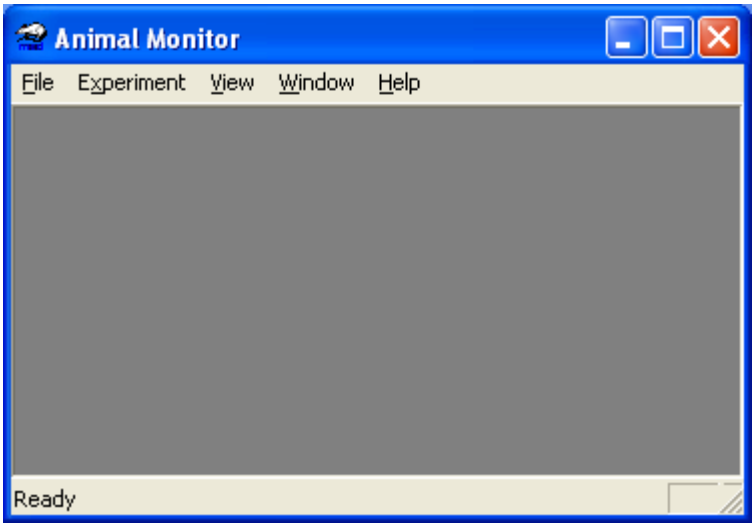
Subject_Subj 1_Experiment_Exp 1.Group_Grp 1.csv

The .CSV extension stands for Comma Separated Values. Using a .CSV file allows for the data to be opened by Microsoft Excel or any other spreadsheet program that is desired.

# CHAPTER 3
## *Menu Options*

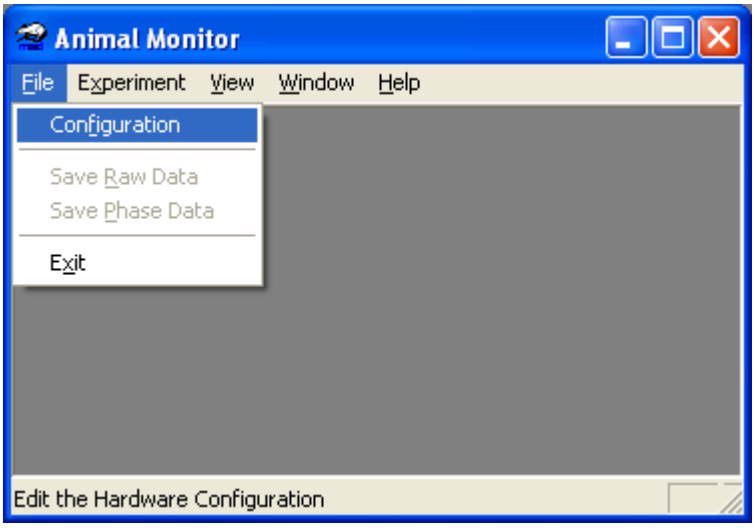
To run Animal Monitor, double click on the Animal Monitor shortcut. The main Animal Monitor window is now displayed, as shown in Figure 3.1. There is a menu displayed across the top of the window with all the software functions that are accessible from this window.

*Figure 3.1 - Animal Monitor Menus*




## File Menu Options

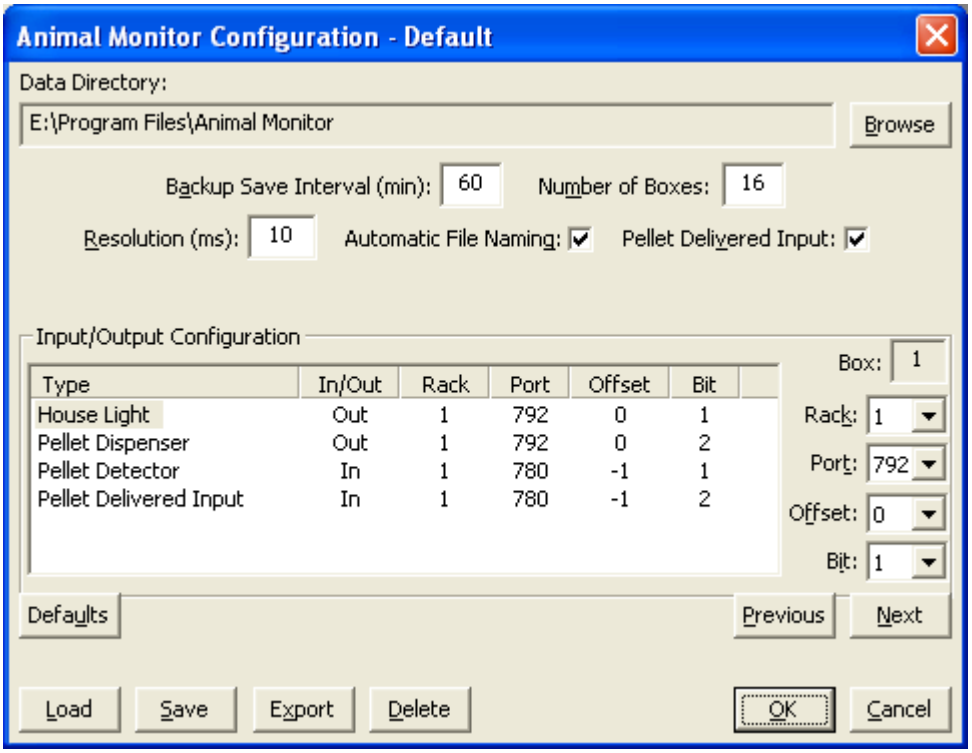
*Figure 3.2 - File Pull Down Menu*



## Configuration

Select **File | Configuration** to setup the hardware configuration for the system and also how often a backup file for the running experiments will be saved. Parameters do not need to be entered every time an experiment is run. The default settings are user-defined and are determined the very first time that the Animal Monitor software is run. Animal Monitor Configuration settings cannot be changed in the middle of an experiment.

*Figure 3.3 - Hardware Configuration Screen*




Following installation, the hardware configuration must be set up such that the software has the necessary information to begin acquiring data. In most cases the default settings will work and the user will only need to change the "Number of Boxes" to match their system. The information entered in the Animal Monitor Configuration window must reflect the system hardware. In this manner, the default settings will match each individual system exactly.

The Animal Monitor Configuration screen requires the following information:

*Table 3-1 - Hardware Configuration Options*

| Item | Description |
|---|---|
| **Data Directory** | The directory to store the data (*.CSV) files in. If unsure which directory to use, click the browse button. A subdirectory named DATA in the Animal Monitor directory is advised and must be created first. |
| **Backup Save Interval (min)** | This is how often the program will save a backup copy of the data while the experiment is running. The Animal Monitor program will create a "Backups" folder in the same directory where the "Animal Monitor.exe" is located (usually C:\Program Files\Animal Monitor\Backups). Setting this value to 0 will turn off the backup saves. The data in the backup file will look exactly like the data in a normal data file, however, the file will be named based on Box number, date the experiment was started, and time the experiment was started.<br>Ex: Box01_06-12-2007_10.16.19.csv<br>Box01_06-12-2007_10.16.19.raw.csv<br>Valid values are 0 for no backups and from 10 to 999 for regular backups. |
| **Number of Boxes** | The number of Boxes or chambers that are available to run experiments in.<br>Valid values are from 1 to 16. |
| **Resolution (ms)** | This is the length of time between each check to see if a pellet is missing. The default value of 10ms is recommended.<br>Valid values are from 1 to 250 for DIG-704 PCI cards. |
| **Automatic File Naming** | Creates data filenames based on Subject, Experiment, and Group. If this check box is not selected, the user must manually enter a file name. |
| **Pellet Delivered Input** | Some pellet dispensers generate an input when a pellet has been dispensed. This input can be used instead of the Pellet Detector input to know when a pellet has been released from the dispenser. |
| **Input/Output Configuration** | This is where the Rack, Port, Offset, and Bit are set for each Input/Output. Each Box will have two outputs (House Light and Pellet Dispenser) and one or two inputs (Pellet Detector and Pellet Delivered Input), refer to Figure 1.2. To change the value(s) for one of the items, just click on the item in the list box so that it is highlighted and then change the value(s) listed in the appropriate drop down box. |
| **Box** | This is the Box or chamber number for which the Rack, Port, Offset, and Bit values are currently being configured. |
| **Rack** | Up to four DIG-704 PCI cards can be supported and talked to by Animal Monitor. Each PCI card is connected to its own Rack that has its own set of cards (SmartCtrl, SuperPort, etc.) in it. This number represents the Rack that this Input/Output is located in.<br>**Note:** The Rack parameter will only be visible if there is more than one DIG-704 PCI card in the computer. If there is only one PCI card in the system, then this number is automatically set to 1.<br>Valid values are from 1 to 4. |
| **Port** | The input Port that the data will be read from for this Bit.<br>Valid values are from 780 to 795. |

| Item | Description |
|---|---|
| **Offset** | The Offset address that the data will be read from for this Bit.<br>Valid values are from 0 – 254 for SuperPort cards and SmartCtrl outputs, and –1 for Standard cards and SmartCtrl inputs. |
| **Bit** | The actual input number or Bit that is to be read for this input.<br>Valid values are 1, 2, 3, 4, 5, 6, 7 and 8. |
| **Defaults** | This button will set all of the values in the Input/Output Configuration back to their default values. Most customers will use the default values in the program. |
| **Previous** | Switch to the Input/Output Configuration values for the previous Box. |
| **Next** | Switch to the Input/Output Configuration values for the next Box. |
| **Load** | Load one of the other saved hardware configuration setups from the Windows Registry. |
| **Save** | Save the current hardware configuration to the Registry. The hardware configuration is saved to:<br>HKEY_CURRENT_USER\Software\MED Associates\Animal Monitor\Hardware\<br>and then by the configuration name (For example, Default).<br>**Note:** If the hardware configuration is saved with the name "Default" then this configuration will be loaded as the default hardware configuration when the program is first started. |
| **Export** | Export the hardware configuration setup from the Registry to a file with a .REG extension. The file name created will be based on the configuration name that it was saved under (For example, Default.reg) and will be saved in the same directory as the Animal Monitor.exe (usually C:\Program Files\Animal Monitor). The .REG file can then be used to setup the hardware configuration on another computer with a similar setup.<br>To import the hardware configuration on the second computer just double click on the .REG file and the settings will be written into the registry. |
| **Delete** | Delete the selected hardware configuration from the registry. |
| **OK** | Save all changes and exit the hardware configuration window. |
| **Cancel** | Discard all changes and exit the hardware configuration window. |

### Save Raw Data

Select **File | Save Raw Data** at any time during an experiment this option will save all of the RAW data that has been collected up to that point into a file in the data folder. The file will be named based on Subject, Experiment, Group, and start date. For example:

Subject_Subj 1_Experiment_Exp 1.Group_Grp 1.06-15-2007.raw.csv

**Note:** This option is only available when an experiment is running.

### Save Phase Data

Select **File | Save Phase Data** at any time during an experiment this option will save all of the Phase data that has been collected up to that point into a file in the data folder. The file will be named based on Subject, Experiment, Group, and start date. For example:

Subject_Subj 1_Experiment_Exp 1.Group_Grp 1.06-15-2007.csv

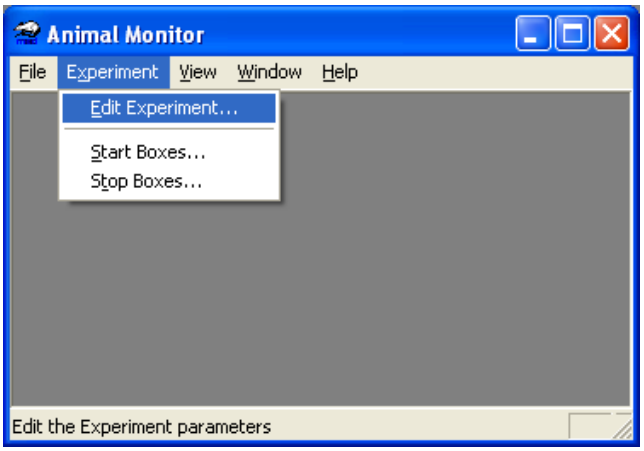
**Note:** This option is only available when an experiment is running.

### Exit

This menu option saves all data from any experiments that are currently running and exits the program.

## Experiment Menu Options

*Figure 3.4 - Experiment Pull Down Menu*




### Edit Experiment

The **Experiment | Edit Experiment** menu option brings up the screen that is used for creating/editing the various experiments. This form is used to define how long an experiment will run, what the "Meal Period End Criteria" is, and to define all of the desired phases.

*Figure 3.5 - Edit Experiment Window*

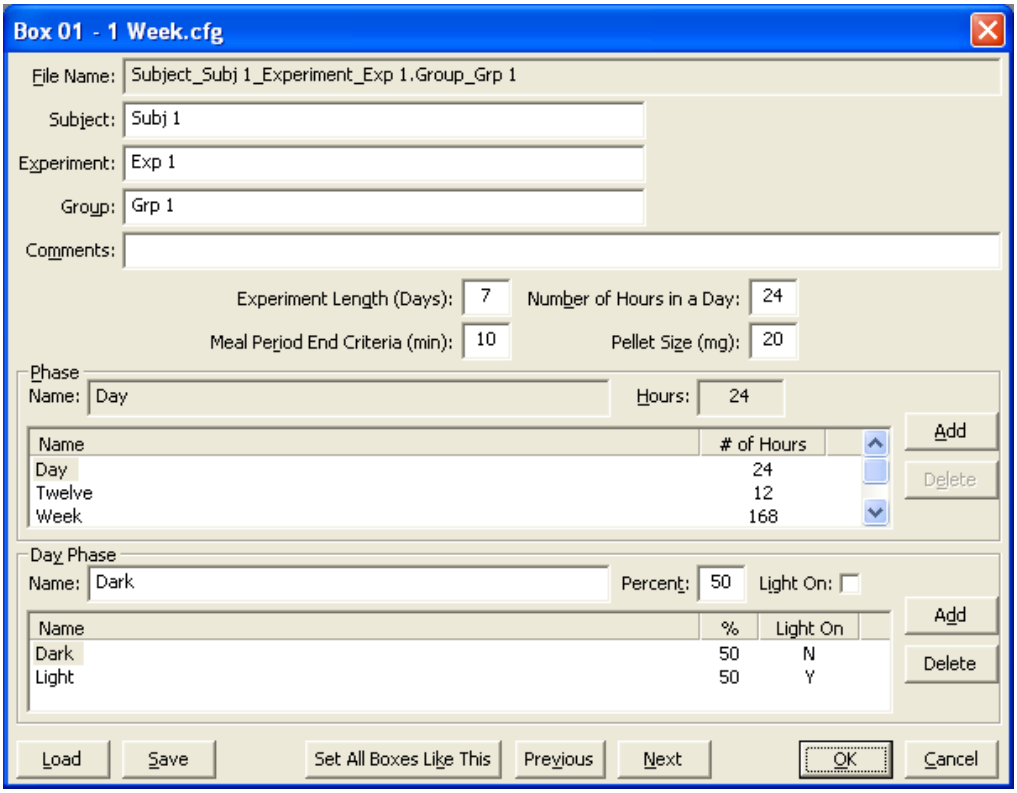



*Table 3-2 - Edit Experiment Options*

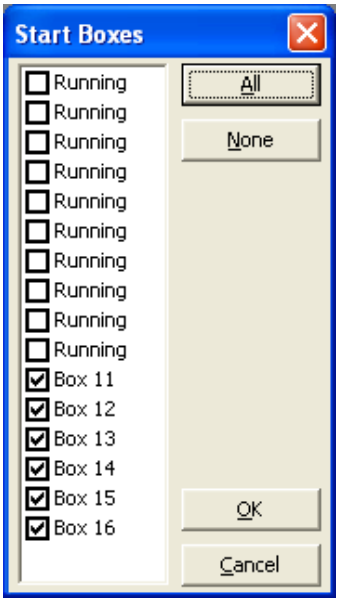
| Item | Description |
|---|---|
| **File Name** | The file name that will be used to save the data in. The file will be saved in the Data Directory that was selected on the Hardware Configuration window. If the Automatic File Naming option was selected, then this field will be filled in automatically using values from the Subject, Experiment, and Group fields listed below. If this option was not selected, then the user may enter in any valid file name. |
| **Subject** | The Subject can be up to 25 characters in length and may also be used to help create the File Name above. |
| **Experiment** | The Experiment can be up to 30 characters in length and may also be used to help create the File Name above. |
| **Group** | The Group can be up to 25 characters in length and may also be used to help create the File Name above. |
| **Comments** | The Comment can be up to 32767 characters long. The Comment field is used to help describe the Experiment that is being run. |
| **Experiment Length (Days)** | The number of Days that the experiment will run.<br>Valid values are from 1 to 999. |
| **Number of Hours in a Day** | The number of hours that in the Day phase. The program is not limited to just 24 hours in one Day. This gives the freedom to determine how longer or shorter Days affect the animals eating patterns.<br>Valid values are from 1 to 999. |

| Item | Description |
|---|---|
| **Meal Period End Criteria (min)** | The number of minutes that must pass without a pellet being taken before the current meal is considered to be over.<br>Valid values are from 1 to 99. |
| **Pellet Size (mg)** | The weight of the food pellets that are being dispensed.<br>Valid values are from 1 to 99. |
| **Phase** | This is where all of the Phases that are to be run should be declared. The Phases break the data down into smaller and/or larger periods of time to allow for closer examination of the data. A Phase called "Day" will automatically be created for the user. The Day Phase must always exist because it controls the turning on and off of the house light. There is no limit to the number of Phases that can be created.<br>Each Phase should be considered to be a mini experiment and all Phases are running at all times. For example if a 12-hour Phase has completed, the data for that Phase is saved and a new 12-hour Phase is immediately started. The same is true for the Day Phase and any other Phases that may have been created. Data from one Phase does not run over into the next Phase. So if a meal ends and 10 minutes later the Phase ends, the next meal starts in the new Phase and there is no Inter-Meal Interval calculated. Again each Phase should be considered as if it was a mini experiment. The only exception is if a meal crosses the ending and beginning of a Phase, all of that meals data is counted in the Phase that it began in. This essentially extends the length of that one Phase. |
| **Name** | The name of the selected Phase in the list box. |
| **Hours** | The number of hours that the selected Phase will run.<br>Valid values are from 1 to 998001 (999 hours * 999 days). |
| **Add** | Add a new Phase to the list box. The new Phase will be given the default name "Unnamed" and start with the same number of hours listed in the "Number of Hours in a Day" field. |
| **Delete** | Delete the selected Phase from the list box.<br>**Note:** The Day Phase cannot be deleted. |
| **Day Phase** | This is where the house light is controlled. This section is essentially creating Sub-Phases in the Day Phase. Each Sub-Phase is run for a percentage of time based on the number of hours in the Day Phase. The percentages from all of the Sub-Phases must total 100%. When one Sub-Phase is finished the next one begins (i.e. they don't all run at the same time). They will continue in succession until the Day is completed and will start over again when the next Day begins. The Sub-Phases will run in order from top to bottom. Two Sub-Phases will be created by default called "Dark" and "Light" and both will be run for 50% of the time. There is no limit to the number of Sub-Phases that can be created. |
| **Name** | The name of the selected Sub-Phase in the list box. |

| Item | Description |
|---|---|
| **Percent** | This is the percentage of time that the Sub-Phase is to be run based on the number of hours in the Day Phase. For example, if the Day Phase is 24 hours long and the Sub-Phase is to be run for 50% of that time, then the Sub-Phase will run for 12 hours. |
| **Light On** | Is the house light to be on or off for this Sub-Phase. |
| **Add** | Add a new Sub-Phase to the list box. The new Phase will be given the default name "Unnamed" and start with the light off for 50% of the time. |
| **Delete** | Delete the selected Sub-Phase from the list box.<br>**Note**: There must always be at least one Sub-Phase declared in the list box. It does not matter if the light is always on or always off. |
| **Load** | Load one of the other saved experiment configuration setups from the computers hard drive. |
| **Save** | Save the current experiment configuration to a file with a .CFG extension. The experiment configuration will be saved in the same directory as the Animal Monitor.exe (usually C:\Program Files\Animal Monitor). The user is prompted to provide a name for the experiment (For example: Default.cfg).<br>**Note**: If the experiment configuration is saved with the name "Default.cfg" then this configuration will be loaded as the default experiment configuration when the program is first started. |
| **Set All Boxes Like This** | Copies all values, except for the Subject value, to the other Boxes. |
| **Previous** | Loads the values from the Previous Box. |
| **Next** | Loads the values from the Next Box. |
| **OK** | Save all changes and open the Start Boxes window. |
| **Cancel** | Discard all changes and exit the window. |

### Start Boxes

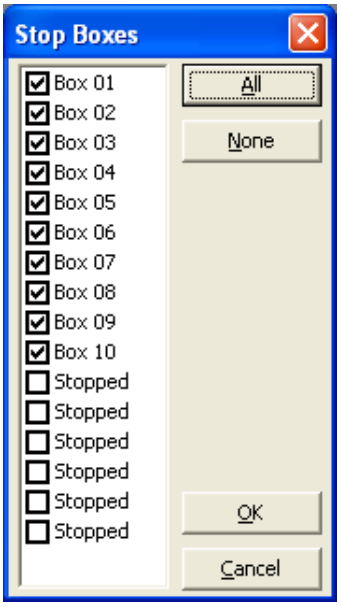
*Figure 3.6 - Start Boxes Screen*




The Start Boxes screen first appears after entering in all of the information in the experiment configuration screen. This screen allows the user to select which Boxes to run. If a Box is already running then the word "Running" appears in place of the Box number. This screen can also be reached by selecting **Experiment | Start Boxes**, but at least one Box must already be running in order for the menu option to be available.

## Stop Boxes

*Figure 3.7 - Stop Boxes Screen*

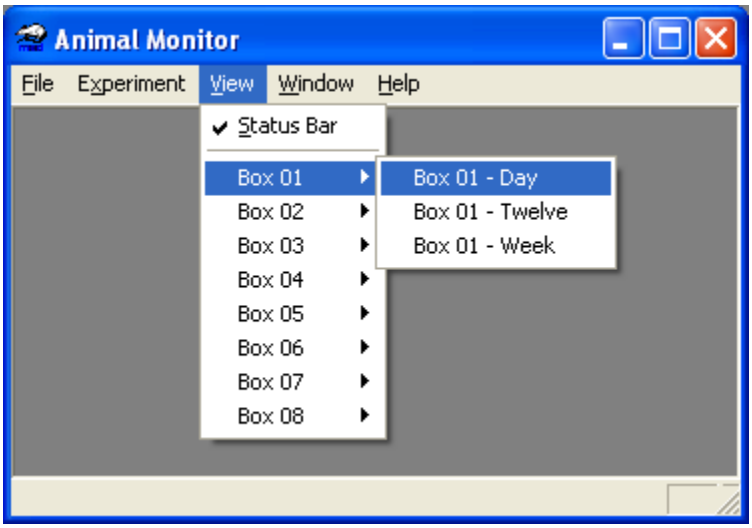



The Stop Boxes screen can be reached by selecting **Experiment | Stop Boxes**. This screen allows the user to select which Boxes that are currently running to stop. When a Box is stopped all data that has been collected is saved and the experiment ended. If a Box is already stopped then the word "Stopped" appears in place of the Box number.

**Note:** This menu option is only available when there are Boxes that are currently running.

## View Menu Options

*Figure 3.8 - View Pull Down Menu*

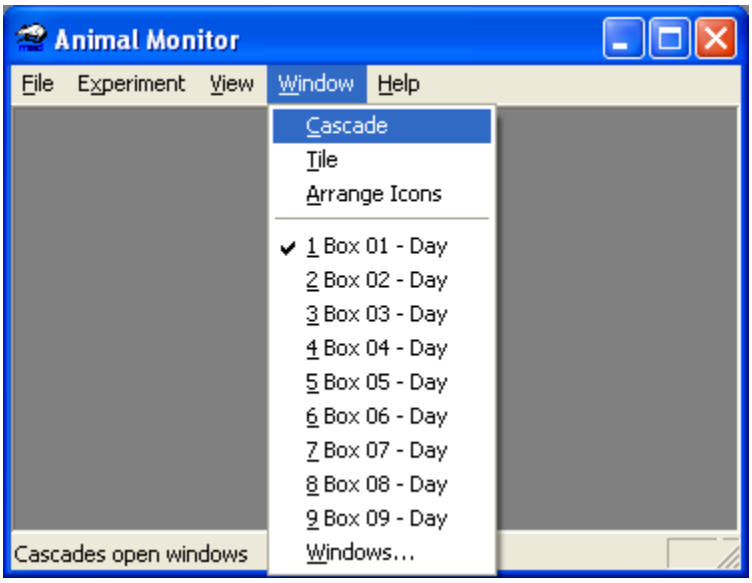



The View menu allows the user to select which windows and or graphs of data to view. By default when an experiment is first started a window is opened for the "Day" Phase. However, if other Phases were created those windows will not be opened. To see the data that is being recorded by those Phases go to the desired Box number and a sub-menu will open up and display all Phases that are available for viewing. If a Box is not currently running, then a sub-menu will not appear when the Box is highlighted.

**Note:** Graphing and displaying the data of the completed Phases is very memory intensive. The more windows that are open at one time, the faster the computer will need to be and possibly more RAM will be required in the computer in order for it to keep up with the graphing. If the computer seems to be responding slowly, try closing some of the open windows and/or increasing the RAM in the computer.

## Window Menu Options

*Figure 3.9 - Window Pull Down Menu*




### Cascade

Selecting the **Window | Cascade** menu option will cause all of the open windows that are not minimized to display in a cascading order in the main window. Windows will be ordered first by Box number then by Phase order.

### Tile

Selecting the **Window | Tile** menu option will cause all of the open windows that are not minimized to be tiled in the main window. Windows will be ordered first by Box number then by Phase order.

### Arrange Icons

Selecting the **Window | Arrange Icons** menu option will cause all of the icons for the minimized windows to line up along the bottom of the main window.

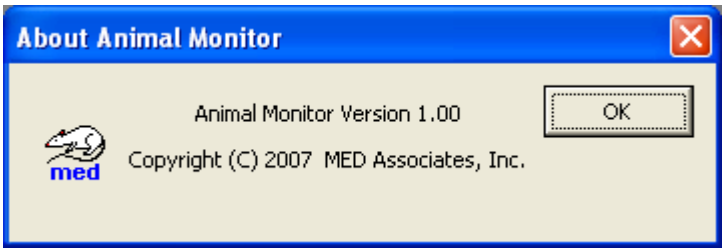
Selecting any of the other menu items under the Window menu will cause the selected window to come to the foreground. The number of windows listed will depend on the number of windows that are open. If there are nine or more windows open, then the **Window | Windows...** menu option will also be listed. Selecting this option will cause a secondary window to open that allows the user to select any of the open windows from a list. Selecting one of the windows from the list will cause that window to come to the foreground.

## Help Menu Options

*Figure 3-10 - Help Pull Down Menu*


### About

*Figure 3-11 – Animal Monitor Copyright And Version Screen*

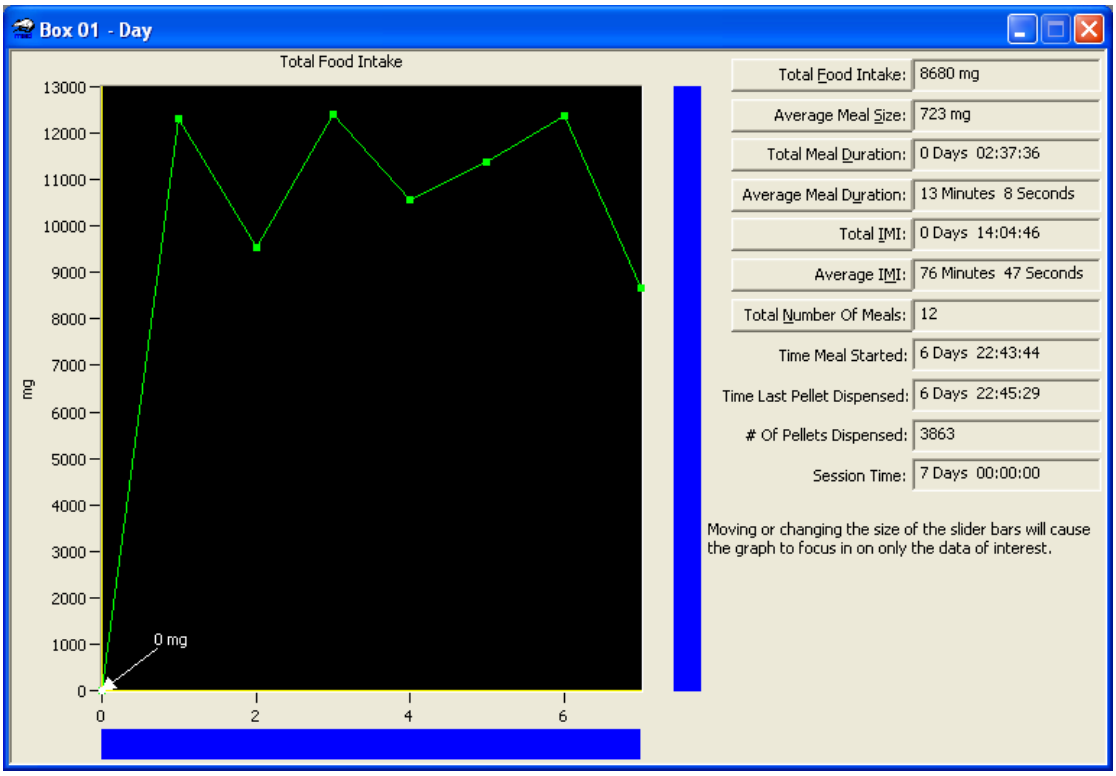



Selecting **Help | About** causes Animal Monitor to display the copyright and version screen.

# CHAPTER 4
## *Understanding and Using the Run-Time Screen*

### Animal Monitor Run-Time Screen

*Figure 4.1 - Animal Monitor Run-Time Screen Showing The Data For Total Food Intake*




The Animal Monitor Run-Time Screen is broken up into two sections. The first is the graph and the second is the data section. We are going to first start with the data section.

### Data Section

The data section displays only the data for the currently running Phase. This gives the user a quick look at all of the information at once and/or where the experiment currently is. There are several pieces of information in the data section including information about when the last meal was started, when the last pellet was dispensed, and how long the experiment has been running. Information on all of the data that is available in the data section is described in detail in the table below.

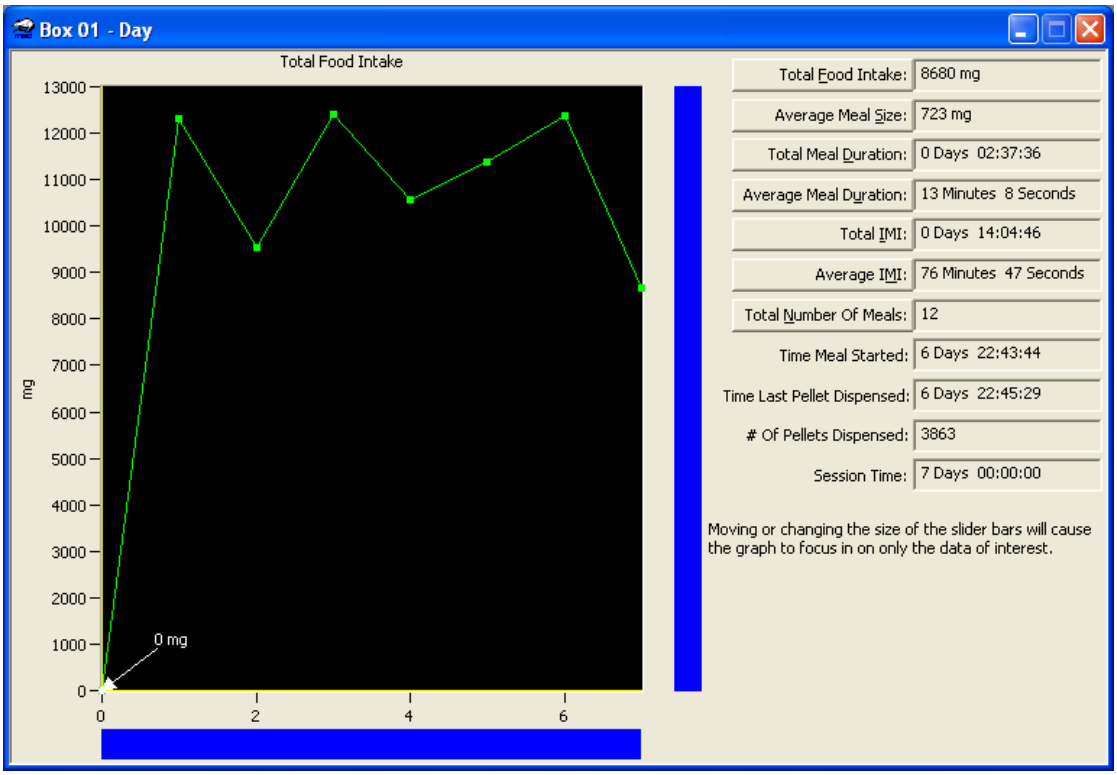
*Table 4-1 - Animal Monitor Run-Time Screen Data Section*

| Item | Description |
|---|---|
| **Total Food Intake** | The total amount of food the animal has eaten during this Phase. During the experiment configuration the weight of the food pellets was entered. This information is used along with the number of pellets that were dispensed to calculate the total weight in milligrams. |
| **Average Meal Size** | Total Food Intake divided by the Total Number of Meals in the currently running Phase. |
| **Total Meal Duration** | The total amount of time the animal has spent eating during this Phase. A meal is started when the first pellet is taken and ends when no pellets have been taken for the "Meal Period End Criteria" (see the experiment configuration section). If the Meal Period End Criteria is set to 10 minutes, then the smallest meal duration will also be 10 minutes. |
| **Average Meal Duration** | The Total Meal Duration divided by the Total Number of Meals for the currently running Phase. |
| **Total IMI** | The total amount of time between the meals during this Phase. There is no Inter-Meal Interval recorded between Phases. So if a meal ends and 10 minutes later the Phase ends, the next meal starts in the new Phase and there is no Inter-Meal Interval calculated between those two meals. |
| **Average IMI** | The Total IMI divided by the (Total Number of Meals – 1) for the currently running Phase. |
| **Total Number of Meals** | The total number of meals during this Phase. A meal is started when the first pellet is taken and ends when no pellets have been taken for the "Meal Period End Criteria" (see the experiment configuration section). If the Meal Period End Criteria is set to 10 minutes, then the smallest meal duration will also be 10 minutes. |
| **Time Meal Started** | The time that the currently active meal or the last meal if in an ITI was started. |
| **Time Last Pellet Dispensed** | The time that the last pellet was dispensed. |
| **# of Pellets Dispensed** | The total number of pellets that have been dispensed since the experiment was started. |
| **Session Time** | The amount of time that has elapsed since the experiment was started. |

## Graph

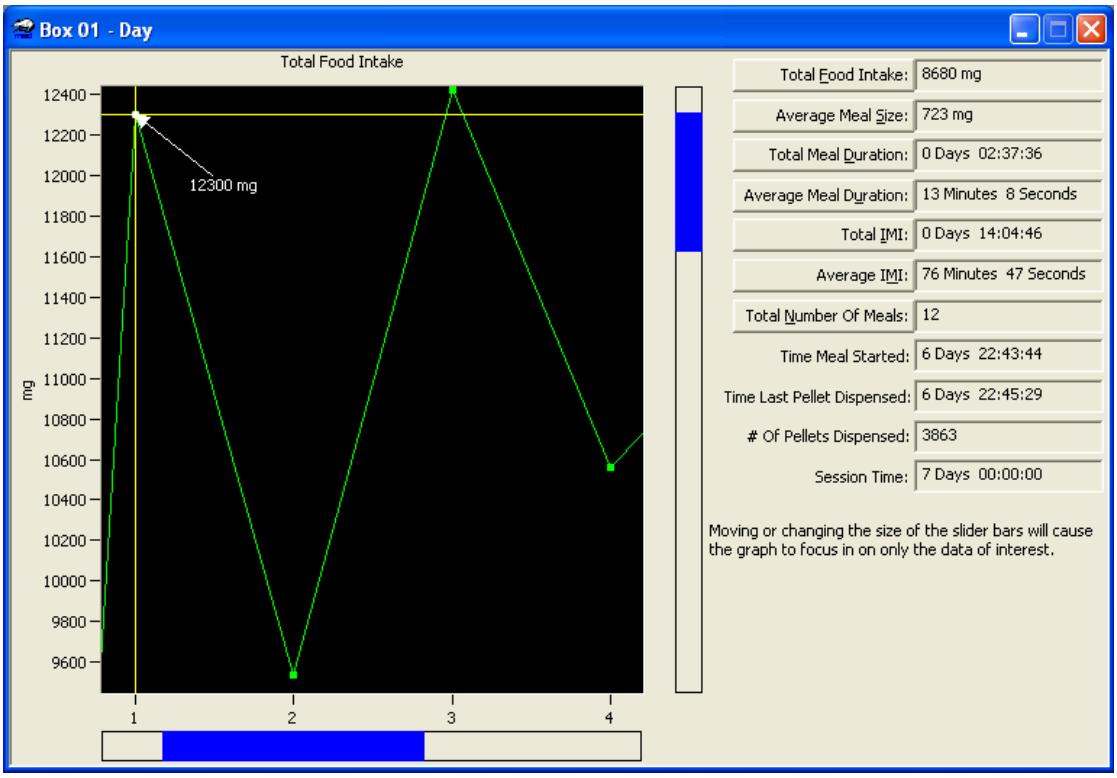
The graph portion of the window displays the history of all of the completed Phases. There are seven possible data lines that could be displayed on the graph: Total Food Intake, Average Meal Size, Total Meal Duration, Average Meal Duration, Total IMI, Average IMI, and Total Number of Meals. A data point will not be added to the graph for a Phase until that Phase has finished completely. So if a Phase runs for 12 hours, then the first data point will be added when the experiment has been running for 12 hours, the second data point will be added when the experiment has been running for 24 hours, etc.

*Figure 4-2 - Animal Monitor Run-Time Screen Showing The Data For Total Food Intake*



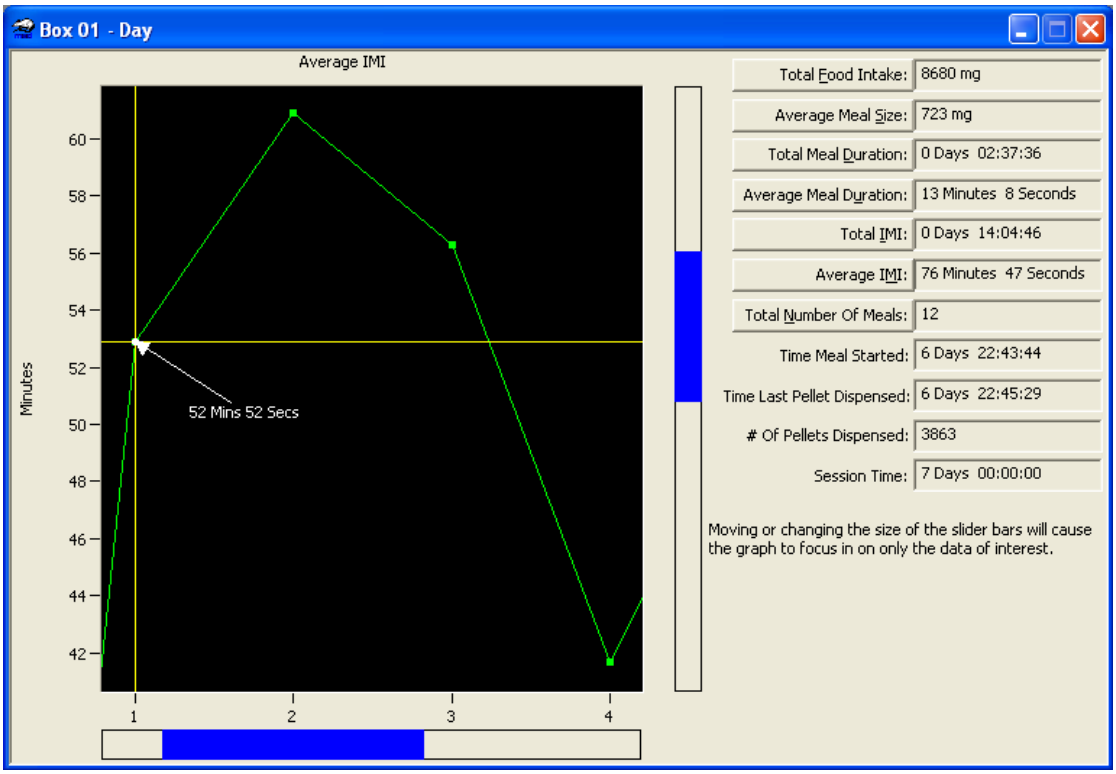

Next to the graph there are two slider bars. The slider bars allow the user to move the graph around so that they can focus on the data of interest.

*Figure 4-3 – Run-Time Screen With The Slider Bars Focused In On 4 Days Of Data*




The buttons on the right hand side of the screen allow the user to select which piece of data to view.

*Figure 4-4 - Run-Time Screen Showing The Data For Average Inter-Meal Interval*




In the graph there is a cursor with an annotation. The cursor shows which data point is selected and the annotation shows the value of the selected data point. The cursor/annotation can be moved by clicking on the graph with the mouse and dragging the cursor/annotation to the desired data point. It can also be moved by using the arrow keys on the keyboard.

**Note:** If the horizontal slider bar is moved, then the cursor/annotation is also moved so that it is always on the screen, however, moving the vertical slider bar will allow the annotation to slide off the screen if the point that is currently highlighted also slides off the screen.

# CHAPTER 5
## *Reading and Understanding the Data Files*

### Analyzed Data Files

The analyzed data filenames end with the .CSV extension.

```
Start Date:                 06-28-2007
End Date:                   07-05-2007
Start Time:                 15:49:06
End Time:                   15:49:06
Subject:                    Subj 1
Experiment:                 Exp 1
Group:                      Grp 1
Comment:
Box:                        01
Resolution:                 10 ms
Experiment Length:          7 Days
Number of Hours in a Day:   24
Meal Period End Criteria:   10 min
Pellet Size:                20 mg
# Phases:                   3
Phase Name:                 Day
Phase Hours:                24
Phase Name:                 Twelve
Phase Hours:                12
Phase Name:                 Week
Phase Hours:                168
# Day Phases:               2
Day Phase Name:             Dark
Day Phase Percent:          50
Day Phase Light On:         0
Day Phase Name:             Light
Day Phase Percent:          50
Day Phase Light On:         1

Total Number of Pellets Dispensed:  3863
```

| Phase Name | Phase Hours | Tot Number of Meals | Tot Food Intake | Average Meal Size | Total Meal Duration | Average Meal Duration | Total IMI | Average IMI |
|---|---|---|---|---|---|---|---|---|
| Day | 24 | 14 | 12300 mg | 878 mg | 0 Days 03:07:58 | 13 Mins 25 Secs | 0 Days 11:27:28 | 52 Mins 52 Secs |
| Dark | 12 | 11 | 8960 mg | 814 mg | 0 Days 02:27:28 | 13 Mins 24 Secs | 0 Days 09:10:34 | 55 Mins 3 Secs |
| Light | 12 | 3 | 3340 mg | 1113 mg | 0 Days 00:40:29 | 13 Mins 29 Secs | 0 Days 02:00:33 | 60 Mins 16 Secs |
| Day | 24 | 17 | 9540 mg | 561 mg | 0 Days 03:54:08 | 13 Mins 46 Secs | 0 Days 16:14:21 | 60 Mins 53 Secs |
| Dark | 12 | 13 | 7140 mg | 549 mg | 0 Days 02:56:08 | 13 Mins 32 Secs | 0 Days 05:27:42 | 27 Mins 18 Secs |
| Light | 12 | 4 | 2400 mg | 600 mg | 0 Days 00:58:00 | 14 Mins 30 Secs | 0 Days 10:18:13 | 206 Mins 4 Secs |
| Day | 24 | 16 | 12420 mg | 776 mg | 0 Days 03:40:18 | 13 Mins 46 Secs | 0 Days 14:04:18 | 56 Mins 17 Secs |
| Dark | 12 | 12 | 8400 mg | 700 mg | 0 Days 02:47:56 | 13 Mins 59 Secs | 0 Days 07:21:42 | 40 Mins 9 Secs |
| Light | 12 | 4 | 4020 mg | 1005 mg | 0 Days 00:52:21 | 13 Mins 5 Secs | 0 Days 06:38:25 | 132 Mins 48 Secs |
| Day | 24 | 15 | 10560 mg | 704 mg | 0 Days 03:32:08 | 14 Mins 8 Secs | 0 Days 09:43:28 | 41 Mins 40 Secs |
| Dark | 12 | 11 | 8160 mg | 741 mg | 0 Days 02:44:30 | 14 Mins 57 Secs | 0 Days 07:20:42 | 44 Mins 4 Secs |
| Light | 12 | 4 | 2400 mg | 600 mg | 0 Days 00:47:37 | 11 Mins 54 Secs | 0 Days 02:15:34 | 45 Mins 11 Secs |
| Day | 24 | 13 | 11380 mg | 875 mg | 0 Days 03:16:32 | 15 Mins 7 Secs | 0 Days 10:32:20 | 52 Mins 41 Secs |
| Dark | 12 | 9 | 7080 mg | 786 mg | 0 Days 02:13:48 | 14 Mins 52 Secs | 0 Days 07:13:44 | 54 Mins 13 Secs |
| Light | 12 | 4 | 4300 mg | 1075 mg | 0 Days 01:02:43 | 15 Mins 40 Secs | 0 Days 02:22:05 | 47 Mins 21 Secs |
| Day | 24 | 15 | 12380 mg | 825 mg | 0 Days 03:40:40 | 14 Mins 42 Secs | 0 Days 18:44:26 | 80 Mins 19 Secs |
| Dark | 12 | 10 | 7680 mg | 768 mg | 0 Days 02:23:04 | 14 Mins 18 Secs | 0 Days 08:00:23 | 53 Mins 22 Secs |
| Light | 12 | 5 | 4700 mg | 940 mg | 0 Days 01:17:35 | 15 Mins 31 Secs | 0 Days 10:07:12 | 151 Mins 48 Secs |
| Day | 24 | 12 | 8680 mg | 723 mg | 0 Days 02:37:36 | 13 Mins 8 Secs | 0 Days 14:04:46 | 76 Mins 47 Secs |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Dark | 12 | 5 | 4200 mg | 840 mg | 0 Days 01:10:34 | 14 Mins 6 Secs | 0 Days 03:22:38 | 50 Mins 39 Secs |
| Light | 12 | 7 | 4480 mg | 640 mg | 0 Days 01:27:01 | 12 Mins 25 Secs | 0 Days 09:22:36 | 93 Mins 46 Secs |

| Phase Name | Phase Hours | Tot Number of Meals | Tot Food Intake | Average Meal Size | Total Meal Duration | Average Meal Duration | Total IMI | Average IMI |
|---|---|---|---|---|---|---|---|---|
| Twelve | 12 | 11 | 8960 mg | 814 mg | 0 Days 02:27:28 | 13 Mins 24 Secs | 0 Days 09:10:34 | 55 Mins 3 Secs |
| Twelve | 12 | 3 | 3340 mg | 1113 mg | 0 Days 00:40:29 | 13 Mins 29 Secs | 0 Days 02:00:33 | 60 Mins 16 Secs |
| Twelve | 12 | 13 | 7140 mg | 549 mg | 0 Days 02:56:08 | 13 Mins 32 Secs | 0 Days 05:27:42 | 27 Mins 18 Secs |
| Twelve | 12 | 4 | 2400 mg | 600 mg | 0 Days 00:58:00 | 14 Mins 30 Secs | 0 Days 10:18:13 | 206 Mins 4 Secs |
| Twelve | 12 | 12 | 8400 mg | 700 mg | 0 Days 02:47:56 | 13 Mins 59 Secs | 0 Days 07:21:42 | 40 Mins 9 Secs |
| Twelve | 12 | 4 | 4020 mg | 1005 mg | 0 Days 00:52:21 | 13 Mins 5 Secs | 0 Days 06:38:25 | 132 Mins 48 Secs |
| Twelve | 12 | 11 | 8160 mg | 741 mg | 0 Days 02:44:30 | 14 Mins 57 Secs | 0 Days 07:20:42 | 44 Mins 4 Secs |
| Twelve | 12 | 4 | 2400 mg | 600 mg | 0 Days 00:47:37 | 11 Mins 54 Secs | 0 Days 02:15:34 | 45 Mins 11 Secs |
| Twelve | 12 | 9 | 7080 mg | 786 mg | 0 Days 02:13:48 | 14 Mins 52 Secs | 0 Days 07:13:44 | 54 Mins 13 Secs |
| Twelve | 12 | 4 | 4300 mg | 1075 mg | 0 Days 01:02:43 | 15 Mins 40 Secs | 0 Days 02:22:05 | 47 Mins 21 Secs |
| Twelve | 12 | 10 | 7680 mg | 768 mg | 0 Days 02:23:04 | 14 Mins 18 Secs | 0 Days 08:00:23 | 53 Mins 22 Secs |
| Twelve | 12 | 5 | 4700 mg | 940 mg | 0 Days 01:17:35 | 15 Mins 31 Secs | 0 Days 10:07:12 | 151 Mins 48 Secs |
| Twelve | 12 | 5 | 4200 mg | 840 mg | 0 Days 01:10:34 | 14 Mins 6 Secs | 0 Days 03:22:38 | 50 Mins 39 Secs |
| Twelve | 12 | 7 | 4480 mg | 640 mg | 0 Days 01:27:01 | 12 Mins 25 Secs | 0 Days 09:22:36 | 93 Mins 46 Secs |

| Phase Name | Phase Hours | Tot Number of Meals | Tot Food Intake | Average Meal Size | Total Meal Duration | Average Meal Duration | Total IMI | Average IMI |
|---|---|---|---|---|---|---|---|---|
| Week | 168 | 102 | 77260 mg | 757 mg | 0 Days 23:49:21 | 14 Mins 0 Secs | 5 Days 22:56:00 | 84 Mins 54 Secs |

The Analyzed data files will always start off with the Day Phase and the Sub-Phases (the Sub-Phases control when the house light is turned on and/or off) listed directly below it. This gives the user the information for the Day and Light/Dark Phases in one general location. The data files then list the information for the rest of the phases. In the above example the Day Phase has two Sub-Phases named Dark and Light and there were two additional Phases called Twelve and Week.

Analyzed data files contain the following measures:

*Table 5-1 - Analyzed Data*

| Measure | Definition |
|---|---|
| **Phase Name** | The name of the Phase. |
| **Phase Hours** | The number of hours in each Phase.<br>**Note:** The number of hours in a Sub-Phase should be entered as a percentage of the Day Phase. So in the above example the Dark and Light Sub-Phases were each 50% of one Day Phase. Since the Day Phase was 24 hours long this means that both Sub-Phases were 12 hours long. |
| **Total Number of Meals** | The total number of meals during this Phase. A meal is started when the first pellet is taken and ends when no pellets have been taken for the "Meal Period End Criteria" (see the Experiment Configuration section of this manual). If the Meal Period End Criteria is set to 10 minutes, then the smallest meal duration will also be 10 minutes. |
| **Total Food Intake** | The total amount of food the animal has eaten during this Phase. During the experiment configuration the weight of the food pellets was entered. This information is used along with the number of pellets that were dispensed in the Phase to come up with the total weight in milligrams. |
| **Average Meal Size** | The Total Food Intake divided by the Total Number of Meals for the Phase. |
| **Total Meal Duration** | The total amount of time the animal has spent eating during this Phase. A meal is started when the first pellet is taken and ends when no pellets have been taken for the "Meal Period End Criteria" (see the Experiment Configuration section of this manual). If the Meal Period End Criteria is set to 10 minutes, then the smallest meal duration will also be 10 minutes. |
| **Average Meal Duration** | The Total Meal Duration divided by the Total Number of Meals for the Phase. |
| **Total IMI** | The total amount of time spent between the meals during this Phase. There is no Inter-Meal Interval recorded between Phases. So if a meal ends and 10 minutes later the Phase ends, the next meal starts in the new Phase and there is no Inter-Meal Interval calculated between those two meals. |
| **Average IMI** | The Total IMI divided by the Total Number of Meals – 1 for the Phase. |

## Raw Data Files

The raw data filenames end with the .RAW.CSV extension. The data files contain the raw data that was recorded when the experiment was first run.

```
Start Date:                 06-28-2007
End Date:                   07-05-2007
Start Time:                 15:49:06
End Time:                   15:49:06
Subject:                    Subj 1
Experiment:                 Exp 1
Group:                      Grp 1
Comment:
Box:                        01
Resolution:                 10 ms
Experiment Length:          7 Days
Number of Hours in a Day:   24
Meal Period End Criteria:   10 min
Pellet Size:                20 mg
# Phases:                  3
Phase Name:                 Day
Phase Hours:                24
Phase Name:                 Twelve
Phase Hours:                12
Phase Name:                 Week
Phase Hours:                168
# Day Phases:              2
Day Phase Name:             Dark
Day Phase Percent:          50
Day Phase Light On:         0
Day Phase Name:             Light
Day Phase Percent:          50
Day Phase Light On:         1

   Date        Time    Box    MED Tick
06-28-2007  15:59:14   1     060816
06-28-2007  15:59:19   1     061326
06-28-2007  15:59:26   1     062045
06-28-2007  16:00:10   1     066475
06-28-2007  16:01:08   1     072207
06-28-2007  16:01:11   1     072541
06-28-2007  16:01:15   1     072989
06-28-2007  16:01:20   1     073459
06-28-2007  16:01:24   1     073816
06-28-2007  16:01:31   1     074539
                .
                .
                .
07-05-2007  14:33:22   1     060025636
07-05-2007  14:33:42   1     060027629
07-05-2007  14:33:57   1     060029135
07-05-2007  14:34:03   1     060029702
07-05-2007  14:34:07   1     060030123
07-05-2007  14:34:12   1     060030619
07-05-2007  14:34:19   1     060031374
07-05-2007  14:34:25   1     060031925
07-05-2007  14:34:35   1     060032942
07-05-2007  14:34:35   1     060032995
```

Raw data files contain the following measures:

*Table 5-2 - Raw Data*

| Measure | Definition |
|---|---|
| **Date** | The date that the pellet was dispensed. |
| **Time** | The time that the pellet was dispensed. |
| **Box** | The Box that dispensed the pellet. |
| **MED Tick** | The MED Tick count that the pellet was dispensed at. 1 MED Tick is equal to the Resolution of the system (see the Hardware Configuration section of this manual).<br>For example, if the Resolution is 10ms, then 100 MED Ticks is equal to 1 second. |