Reproducible Research Demo

OHSU Center for Health Systems Effectiveness

Wednesday, July 22, 2015

Contents

Last update by Stephanie Renfro (renfrst@ohsu.edu) on 2015-07-22 09:17:38 using R version 3.1.2 (2014-10-31).

Purpose

This work was inspired by the following email from Farmer Ben.

```
From: Ben Chan
Sent: Thursday, June 11, 2015 4:04 PM
To: Stephanie Renfro
Subject: What to feed chicks

Hello,

I'm receiving 20 baby chicks next month. Can you help me decide what to feed them? I'm choosing between

1.  Grower diet
2.  Layer diet
3.  Breeder diet
4.  High cluckage diet

Thanks,
Ben

---------------------------------------------------------------
Ben Chan, Farmer and Research Associate
OHSU Center for Health Systems Effectiveness
Office: 3030 SW Moody | Mail Code: MDYCHSE
www.ohsu.edu/chse
```

Preliminaries

Start clock to calculate total runtime.

```
start_program <- proc.time()
```

Load needed packages:

- *data.table* - for faster processing
- *knitr* - for better table display ("kable" function)
- *ggplot2* - for pretty plots

```
packages <- c("data.table", "knitr", "ggplot2")
sapply(packages, require, character.only=TRUE, quietly=TRUE)
```

```
## data.table      knitr    ggplot2
##       TRUE       TRUE       TRUE
```

Define the CHSE color palette function.

```
colorPalette <- function () {
  c(rgb(  1,  67, 134, maxColorValue=255),
    rgb(119, 120, 123, maxColorValue=255),
    rgb(139, 184, 234, maxColorValue=255),
    rgb(188, 190, 192, maxColorValue=255),
    rgb( 94, 122, 162, maxColorValue=255),
    rgb(223, 122,  28, maxColorValue=255))
}
```

Prepare Data

This demo uses data from an experiment on the effect of diet on early growth of chicks, `ChickWeight`, which comes pre-loaded in any R session.

Let's take a look at the first few rows:

```
head(ChickWeight)
```

```
##   weight Time Chick Diet
## 1     42    0     1    1
## 2     51    2     1    1
## 3     59    4     1    1
## 4     64    6     1    1
## 5     76    8     1    1
## 6     93   10     1    1
```

Let's also print a summary of the data.

Note, by specifying the option "echo = FALSE", the resulting output will display, but not the code that generated it.

```
##      weight           Time           Chick     Diet
##  Min.   : 35.0   Min.   : 0.00   13     : 12   1:220
```

```
##  1st Qu.: 63.0   1st Qu.: 4.00   9      : 12   2:120
##  Median :103.0   Median :10.00   20     : 12   3:120
##  Mean   :121.8   Mean   :10.72   10     : 12   4:118
##  3rd Qu.:163.8   3rd Qu.:16.00   17     : 12
##  Max.   :373.0   Max.   :21.00   19     : 12
##                                  (Other):506
```

Convert to data.table for faster processing.

```
ChickWeight <- data.table(ChickWeight)
```

Just for fun, let's create a table showing mean weight at times 0, 10, and 21 days, for each of the four diet types.

```
mean_ChickWeight <- ChickWeight[Time %in% c(0,10,21),
                                list(mean_weight = round(mean(weight), digits=1)),
                                by = list(Diet,Time)]

kable(mean_ChickWeight)
```

Diet	Time	mean_weight
1	0	41.4
1	10	93.1
1	21	177.8
2	0	40.7
2	10	108.5
2	21	214.7
3	0	40.8
3	10	117.1
3	21	270.3
4	0	41.0
4	10	126.0
4	21	238.6

Create a character variable for `diet`. Use this variable for plotting small multiples.

```
ChickWeight[, dietChr := sprintf("Diet %d", Diet)]
```

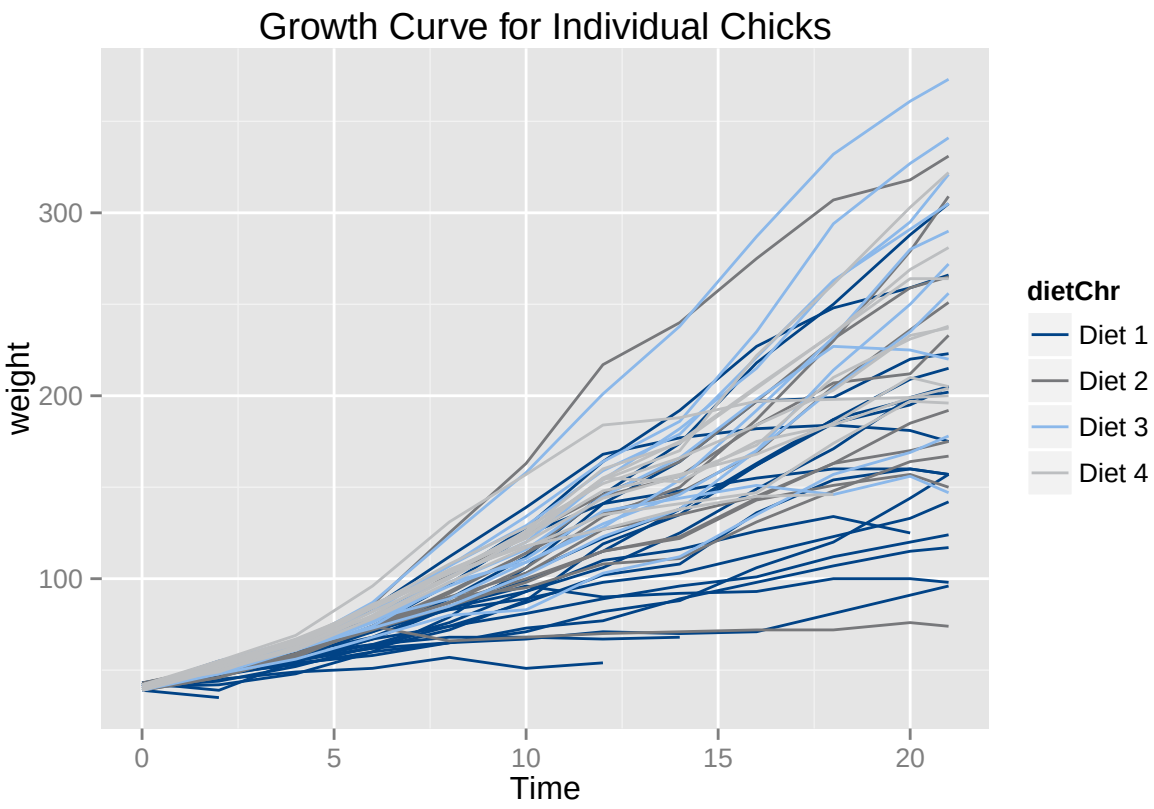
```
##      weight Time Chick Diet dietChr
##   1:     42    0     1    1  Diet 1
##   2:     51    2     1    1  Diet 1
##   3:     59    4     1    1  Diet 1
##   4:     64    6     1    1  Diet 1
##   5:     76    8     1    1  Diet 1
##  ---
## 574:    175   14    50    4  Diet 4
## 575:    205   16    50    4  Diet 4
## 576:    234   18    50    4  Diet 4
## 577:    264   20    50    4  Diet 4
## 578:    264   21    50    4  Diet 4
```

Growth for Individual Chicks

The following plot illustrates the growth curve for individual chicks from 0 to 21 days.

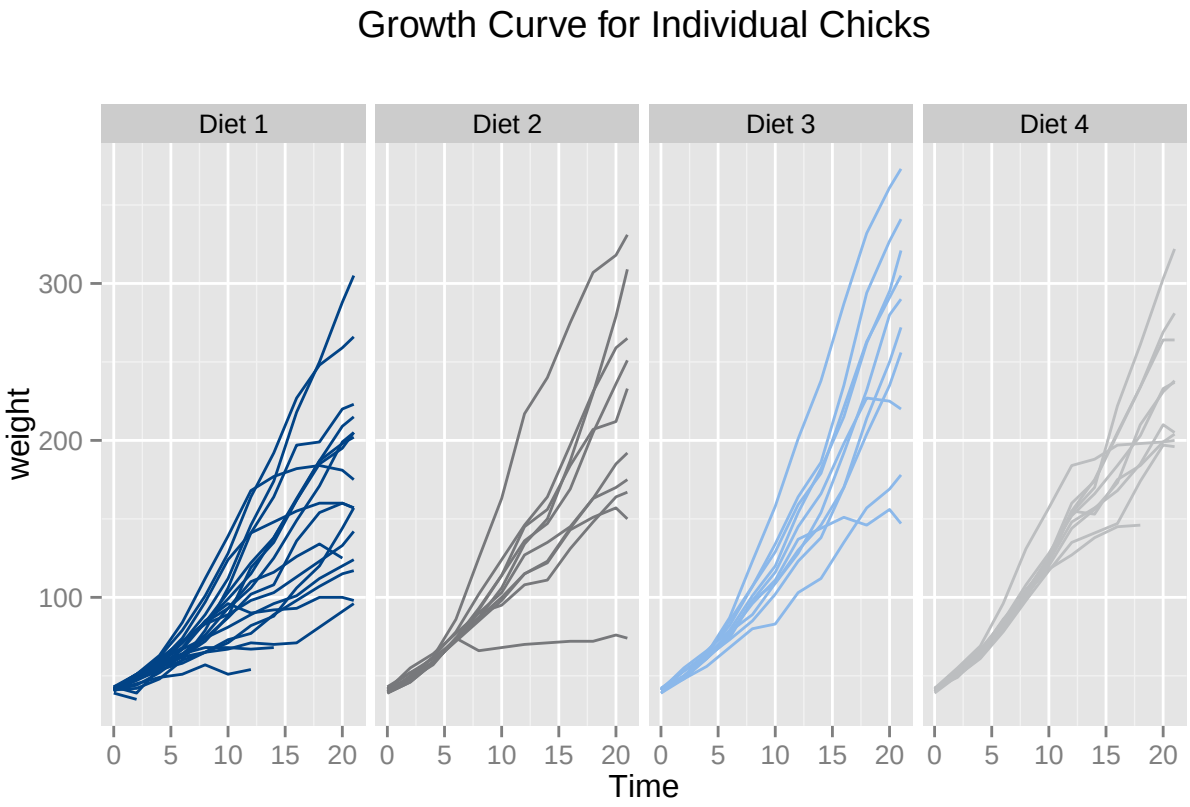
Colors represent the four diets.

From this plot, it is difficult to distinguish between the performance of the four diets.



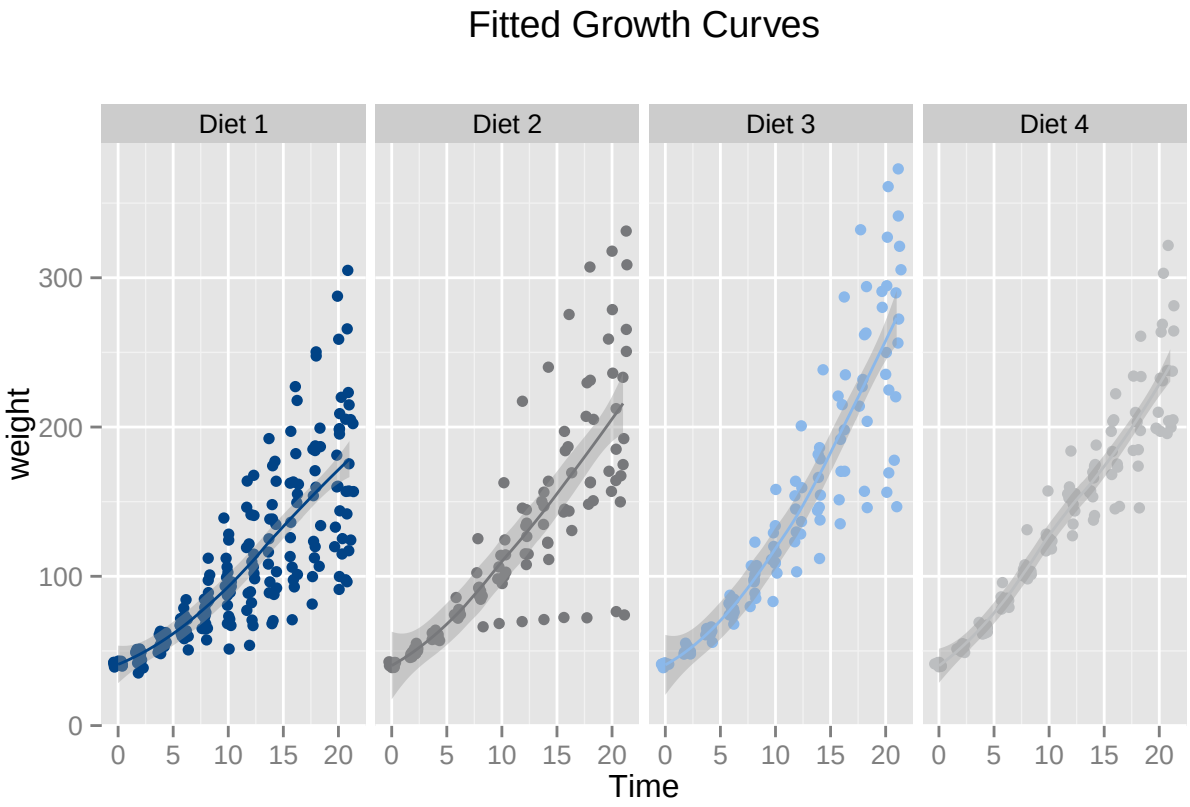
Individual growth curves

Plot individual chick growth curves using small multiples.



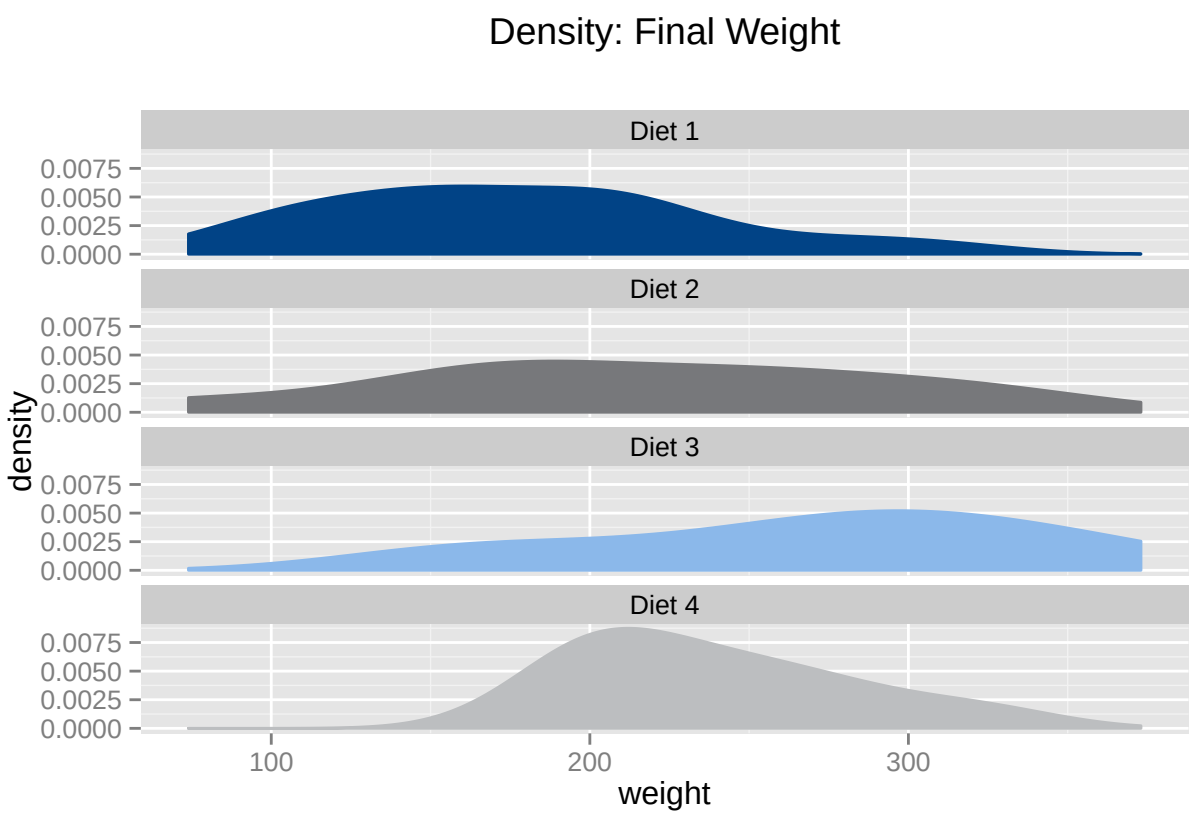
Fitted growth curves

Plot fitted growth curves using small multiples. Data points are jittered around time value.



Final weight density

Plot densities by diet for chicks' final weights (day 21) using small multiples.



Wrap Up

Calculate total runtime.

```
time_program <- proc.time()-start_program
print(paste("Total runtime:", format(time_program[3]/60,digits=3), "minutes"))
```

```
## [1] "Total runtime: 0.094 minutes"
```

Clear memory.

```
rm(list=ls())
invisible(gc())
```