

Stat 251 / OBEE 216, Winter 2003
HW Solutions by Katherine Hinde

Project _2_1

Subjects were female pig-tailed macaques (*Macaca nemestrina*, N=250)

Sample was randomly selected from records that satisfied the following criteria:

Colony bred

Assigned to the breeding colony and not research projects for each of their first two pregnancies (gravidities)

Same housing and feeding condition

Weighed within the two months (0-61 days) prior to their first conception.

Weights were collected as normal animal husbandry protocol and not intended for any specific study (technicians blinded to potential uses of data).

The parameter of interest of this assignment is female weight at conception.

Descriptive results of the sample with regard to weight (kg) are:

Mean 5.04

SD .736

N=250 df=249

SE .046

t ($\alpha = 0.05$, 1.645)

Var .542

Range 3.35-7.74

Additionally, a histogram of the sample results are presented in Figure 1. (pg 2).

A data driven estimate of a 95% confidence interval for this parameter is:

Formula: $CI = X \pm t(\delta/\sqrt{n}) = 5.04 \pm 1.645(.736/\sqrt{250}) = 5.04 \pm 1.645(0.046) = \mathbf{5.04 \pm 0.076}$

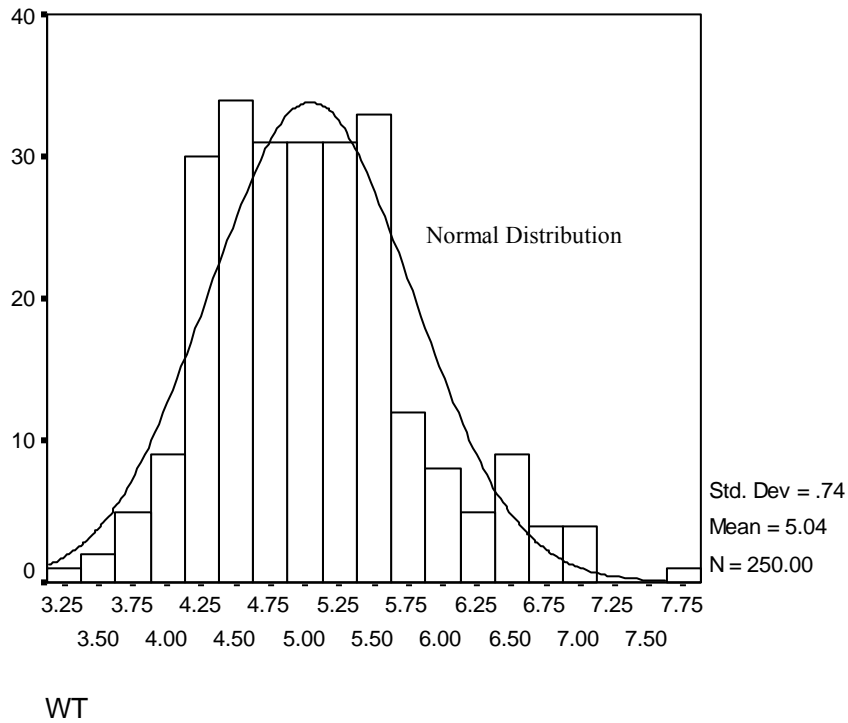
|-----95%CI-----|
---4.964-----5.04-----5.116---

An unbiased estimate of the population mean weight within two months prior to conception is **5.04±0.076**. This estimate is quite precise, ±1.5%. The confidence interval is fairly tight.

The distribution of this sample is most similar to a **Chi square distribution (x^2)**. The right tail is longer than the left tail, indicating that a few females are quite heavy. There are two reasons why we see these results. 1. In captive populations animal health is well monitored and low weight animals are targeted for extra nutrition (the proximate explanation). 2. The sample was restricted to females that were weighed within the two months before conception. Clearly, as in humans, there is a threshold weight that must be attained before conception can occur (the ultimate explanation), so we would expect a longer tail on the heavier weight side of the distribution and a more abrupt end to the tail on the lower weight side. By redoing the sampling criteria (all females, not limiting the sample to reproductively viable females) I expect that a more normal distribution for

weight would emerge, but that the sample would always have more heavy females than skinny females due to the “captive effect”.

Figure 1. Histogram of female weights (kg). within the two months prior to first conception.



Descriptive statistics were generated using SPSS 11.0
95% Confidence Interval was generated by hand using the formula from class lectures
Raw data set can be provided upon request.