Question Set Solution

Agricultural Statistics, 4th Semester, IAAS, 2078

Deependra Dhakal

November, 2021

1 Essay Type Question

1. (10 points) A set of data involving four feed stuffs used A, B, C and D tried on certain 20 mice is given in Table 1 below. All the mice are treated alike in all respects except the following treatment and each feeding is given to 5 mice.

Table 1: Feeding treatment and weight gain in mice

	Weight gain				
Feed					
A	45	56	54		
B	45	65	67	23	
C	23	45	18	67	78
D	45	34			

Test the hypothesis that the mean effect of feeds is same or not.

Solution: (Question 1)

Given information in the Table 1 from feeding experiment involves missing data for some mice (Only x mice are represented despite involving a total of 20).

Since we are interested in whether or not the weight gain due to different feed ($t = 4$) are different, a widely used technique for comparison of group difference involving more that 2 groups is F-test. The F-test can be employed most easily with analysis of variance (ANOVA) setting. Although, it should be noted, due to unequal group sizes (ie. there are 3 mice in Feed A group, 4 mice in Feed B group, and so on), validity of group difference comparison is limited only to the data available.

Table 2: Mean weight gain of mice in each treatment (feeding) group

Feed	Mean weight gain
A	51.67
B	50.00

C	46.20
D	39.50

To detect the difference in treatment means, we formulate the following Null hypothesis, of which if no sufficient evidence is found for acceptance we assert that difference between mean of Feeding groups exist.

$$\mu_A = \mu_B = \mu_C = \mu_D = \mu_E$$

Total variance due to feeding treatment can be disaggregated into effects due to Feed and the noise (residual). Respective variances components, degrees of freedom, and the F-value for treatment factor are computed and shown in the ANOVA (Table 4).

Table 3: ANOVA of study on mice weight gain due to various feeding treatment

Source of variation	DF	Sum of squares	Mean sum of squares	F-value	P-value
Feed	3	213.53	71.18	0.17	0.91
Residuals	10	4175.97	417.60		

Table 4: Difference of mean between treatment groups using LSD method. Group difference is indicated by lowercase letters (all 'a' for every Feed group).

Feed	Weight gain	Groups
A	51.67	a
B	50.00	a
C	46.20	a
D	39.50	a

It can be concluded based on Null Hypothesis Significance Testing (NHST) that, no Feeding groups are different.

2 Short Questions

1. (4 points) Wheat do you mean by the random sampling ? Differentiate between stratified sampling and cluster sampling.

Solution:

Write anything but not the correct answer.