

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

RESIT/SPECIAL EXAMINATION

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN
ANIMAL NUTRITION

ANSC 813: STATISTICAL COMPUTING IN ANIMAL NUTRITION

STREAMS: MSC

TIME: 2 HOURS

DAY/DATE: TUESDAY 24/07/2018

2.30 P.M. – 4.30 P.M.

INSTRUCTIONS:

- All questions to be done using the program R.
- Save numerical outputs in a text file. (txt). Mark the text file with your admission number.
- Save diagrams as pdf files (.pdf). Mark all pdf files with your admission number.
- Attempt ALL questions.

1. The data below is on birth weight of Dorper Lambs in Kenya. Use it to answer the questions that follow

Males	4	4	4.5	3.5	3.5	3.5	4.5	4.5	3.5	3	3.5	4	4	3.5	4.5	4	4	3	3	3
Females	2.5	4	3.5	4	3	4	3.5	3.5	3	3	3	2.5	3	3.5	3	3.5	5	4	3	4

- (a) Use the data to estimate the mean and standard deviation for birth weight. (5 marks)
- (b) Construct a histogram to examine the distribution of birth weight in Dorper Lambs (5 marks)
- (c) Test the hypothesis
 $H_0: \mu_{\text{birthweight}} = 3.76 \text{ kg}$ vs $H_a: \mu_{\text{birthweight}} \leq 3.76 \text{ kg}$ (5 marks)

- (d) Is there evidence from the data that male lambs are heavier than female lambs at birth? Use $\alpha=0.05$ (5 marks)

2. A researcher was provided with the following data set analysis

Treatment 1	4.3	4.6	4.7	5.1	5.3	5.3	5.8
Treatment 2	3.5	3.8	3.7	3.9	4.4	4.7	5.2

- (a) Construct well labelled boxplots and histograms to evaluate the distribution of the data. (10 marks)
- (b) Determine (with clear justification) the appropriate analysis to determine whether the two treatments have equal effects. (10 marks)

marks)

3. A test was conducted to determine the effect of percentage crude protein (%CP) in the diet on milk production. Data collected was on daily milk yield for 10 days. Experimental cows were of the same breed and approximately same age, weight and at the same lactation stage. The quantity of feed provided to each cow per day was the same.

% CP	Milk	Yield	(kg per	Day)						
25	16	14	16	17	12	16	14	13	14	15
20	16	11	11	6	12	11	12	13	16	9
15	10	9	6	16	9	13	9	17	11	5

- (a) Construct a well labelled bar-chart comparing the mean performance of cows fed on different %CP (5 marks)
- (b) Use the data to perform the following analysis
 $H_0: \mu_{25\%CP} = \mu_{20\%CP} = \mu_{15\%CP}$
 $H_a: \text{At least one of the } \mu \text{'s is different \& the rest}$ (15 marks)

4. An animal Nutrition Msc student conducted an experiment to test the effect of the amount of roughage in the diet on milk protein in Hostein Friesian cows. The experiment was conducted on a University farm which had 12 cows in their first lactation, 12 cows in the second lactation and 12 cows in the third lactation. The student opted to use all the available cows to increase the sample size. Three diets i.e. diet A, diet B and diet C, corresponding to three levels of roughage inclusion were tested. Each diet was fed to 4 cows in each lactation. Feeding was ad lib. Data was on the amount of milk protein produced per day and was collected for 3 days. The data is presented below.

diet	day	cow	lac	pro t	diet	day	cow	Lac	pro t	die t	da y	co w	lac	pro t
A	d1	c1	lac1	3.6	A	d2	c1	lac1	1.9	A	d3	c1	lac1	3.6
A	d1	c2	lac 2	4.3	A	d2	c2	lac2	2.2	A	d3	c2	lac2	2.0
A	d1	c3	lac3	3.0	A	d2	c3	lac3	2.5	A	d3	c3	lac3	2.2
A	d1	c4	lac4	3.4	A	d2	c4	lac4	3.1	A	d3	c4	lac4	3.4
B	d1	c5	lac1	3.9	B	d2	c5	lac1	3.8	B	d3	c5	lac1	3.2
B	d1	c6	lac2	2.6	B	d2	c6	lac2	2.6	B	d3	c6	lac2	2.1
B	d1	c7	lac3	4.0	B	d2	c7	lac3	3.0	B	d3	c7	lac3	2.9
B	d1	c8	lac4	2.5	B	d2	c8	lac4	3.0	B	d3	c8	lac4	1.5
C	d1	c9	lac1	4.3	C	d2	c9	lac1	3.5	C	d3	c9	lac1	2.9
C	d1	c10	lac2	3.3	C	d2	c10	lac2	3.7	C	d3	c10	lac2	4.2
C	d1	c11	lac3	3.4	C	d2	c11	lac3	3.9	C	d3	c11	lac3	4.6
C	d1	c12	lac4	3.5	C	d2	c12	lac4	2.8	C	d3	c12	lac4	3.6

Run the appropriate analysis of variance to determine the effects significantly affecting protein percentage, fitting an interaction between the effects of the cow and lactation. (20 marks)

5. Data below was collected from a Latin Square experiment.

Row	Column			
	1	2	3	4
1	(A)1.75	(C)1.45	(D)1.28	(B)1.66
2	(B)1.70	(A)1.78	(C)1.40	(D)1.31
3	(C)1.35	(B)1.73	(A)1.69	(C)1.41
4	(D) 1.45	(D)1.36	(B)1.65	(A)1.73

Use the data to run the appropriate analysis of variance (20 marks)
