UNIVERSITY OF EMBU

2016/2017 ACADEMIC YEAR

FIRST SEMESTER EXAMINATION

FOURTH YEAR EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN RANGE MANAGEMENT

AAS 405: ANIMAL BREEDING

DATE: DECEMBER 8, 2016 **TIME: 11:00AM-1:00PM**

INSTRUCTIONS:

Answer Question ONE and ANY other TWO Questions

QUESTION ONE (30 MARKS)

a) Define the following terms

i.) Inbreeding coefficient (1 mark)

ii.) Response to selection (1 mark)

iii.) Selection intensity (1 mark)

b) Explain the differences between the following terms

i.) Breeding value and genetic value (2 marks)

ii.) Heritability and repeatability (2 marks)

iii.) Selection and mating (2 marks)

c) Explain the following concepts as relevant to animal breeding

i.) A random mating population (3 marks)

ii.) Crossbreeding (3 marks)

d) Give 2 examples of traits of economic importance in indigenous chicken in Kenya (2 marks)

e) Explain why the indigenous chicken are referred to as types and not breeds (2 marks)

f) Explain the importance of animal breeding (2 marks)

g) Describe two objectives of animal breeding (2 marks)

h) Assume a single locus situation with two alleles. The frequency of the dominant allele is 0.8. Calculate the respective genotypic frequencies of the resulting genotypes (3 marks)

i) Describe additive genetic relationship between 2 half siblings (3 marks)

j) Explain why the estimated breeding values (EBV) are usually given a negative or positive sign (2 marks)

k) Name two basic tools used by animal breeders to improve populations (2 marks)

QUESTION TWO (20 MARKS)

a) Explain how you can estimate breeding value from observed phenotype (3 marks)

b) The breeding value for yearling weight (yw) of Kenya beef Boran beef cattle is +20 while its phenotypic value is +80. Calculate the heritability for yw (3 marks)

c) The average yearling weight (YW) of a Kenya Boran beef cattle is 300kg. The heritability for this trait is h^2=0.4. Assume there is no effect of sex on YW and bull "X" is 340 kg at one year. Calculate the expected mean value of his progeny if the bull is mated to;

i. A randomly selected cow (3 marks)

ii. A top cow with a YW of 330Kg (2 marks)

d) Describe the two categories of traits that are applicable to animal breeding (6 marks)

QUESTION THREE (20 MARKS)

a) Describe the procedure of tandem mating (2 marks)

b) Describe the importance of BLUP over mass selection (2 marks)

c) Discuss four factors that contributes to genetic change in a population (4 marks)

d) Discuss the suitability and shortfalls of application of the following biotechnology tools in animal breeding

i.) AI (4 marks)

ii.) MOET (4 marks)

iii.) Cloning (4 marks)

QUESTION FOUR (20 MARKS)

a) The breeding station KAGRC had a famous bull called Kitanga. Kitanga sired cows Lucia, Nyako and Wamboi. Lucia in turn mated with Thomas and produced Atoti while Nyako mated with an unknown bull to produce Ngeno. Ngeno and Atoti mated and produced an offspring called Njiru.

i.) Draw the pedigree structure for these relationship (4 marks)

ii.) Calculate the additive genetic relationship between Atoti and Ngeno (3 marks)

iii.) Calculate the inbreeding coefficient of Njiru (3 marks)

iv.) Njiru, with EBV for milk yield of +110kg was mated with Makena, with EBV of +80kg. The herd average is 8000kg. Calculate the expected milk yield of their daughter June. (4 marks)

b) Explain the differences between the three disciplines relevant in animal breeding (6 marks)

QUESTION FIVE (20 MARKS)

a) In a population of 2000 rabbits, 200 does and 20 bucks were selected as parents of the next generation. The growth rate is 250mg/day and the average growth rate of the selected population is 300mg/day.

i.) Determine the selection intensity for males i_m and females i_f (use intensity tables) (2 marks)

ii.) Calculate the selection differential (SD) for the selected populations and genetic response to selection (R) of this rabbit breeding program if the phenotypic variance is 10,000 mg^2. (4 marks)

iii.) Calculate the response to selection if the accuracy of selection is 0.87, additive genetic standard deviation is 200mg and the generation interval is 0.5 years. (4 marks)

b) Describe the legal and institutional framework for animal breeding practices applicable in Kenya (10 marks)

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APPENDIX

Appendix A **Selection Intensity Table**

of a large sample truncated standard normal distribution, giving the truncation point and the average value of the selected group for a certain selected **percentage**

% selected	truncation point (x)	selection intensity (i)
0.01	3.719	3.959
0.02	3.540	3.789
0.03	3.432	3.687
0.04	3.353	3.613
0.05	3.291	3.554
0.06	3.239	3.506
0.07	3.195	3.465
0.08	3.156	3.428
0.09	3.121	3.396
0.10	3.090	3.367
0.12	3.036	3.316
0.14	2.989	3.273
0.16	2.948	3.235
0.18	2.911	3.201
0.20	2.878	3.170
0.22	2.848	3.142
0.24	2.820	3.117
0.26	2.794	3.093
0.28	2.770	3.071
0.30	2.748	3.050
0.32	2.727	3.030
0.34	2.707	3.012
0.36	2.687	2.994
0.38	2.669	2.978
0.40	2.652	2.962
0.42	2.636	2.947
0.44	2.620	2.932
0.46	2.605	2.918
0.48	2.590	2.905
0.50	2.576	2.892
0.50	2.576	2.892
0.55	2.543	2.862
0.60	2.512	2.834
0.65	2.484	2.808
0.70	2.457	2.784
0.75	2.432	2.761
0.80	2.409	2.740
0.85	2.387	2.720
0.90	2.366	2.701
0.95	2.346	2.683
1.00	2.326	2.665

% selected	truncation point (x)	selection intensity (i)
1.0	2.326	2.665
1.2	2.257	2.603
1.4	2.197	2.549
1.6	2.144	2.502
1.8	2.097	2.459
2.0	2.054	2.421
2.2	2.014	2.386
2.4	1.977	2.353
2.6	1.943	2.323
2.8	1.911	2.295
3.0	1.881	2.268
3.2	1.852	2.243
3.4	1.825	2.219
3.6	1.799	2.197
3.8	1.774	2.175
4.0	1.751	2.154
4.2	1.728	2.135
4.4	1.706	2.116
4.6	1.685	2.097
4.8	1.665	2.080
5.0	1.645	2.063
5.0	1.645	2.063
5.5	1.598	2.023
6.0	1.555	1.985
6.5	1.514	1.951
7.0	1.476	1.918
7.5	1.440	1.887
8.0	1.405	1.858
8.5	1.372	1.831
9.0	1.341	1.804
9.5	1.311	1.779
10.0	1.282	1.755
11	1.227	1.709
12	1.175	1.667
13	1.126	1.627
14	1.080	1.590
15	1.036	1.554
16	0.995	1.521
17	0.954	1.489
18	0.915	1.458
19	0.878	1.428

% selected	truncation point (x)	selection intensity (i)
20	0.842	1.400
21	0.806	1.372
22	0.772	1.346
23	0.739	1.320
24	0.706	1.295
25	0.675	1.271
26	0.643	1.248
27	0.613	1.225
28	0.583	1.202
29	0.553	1.180
30	0.524	1.159
31	0.496	1.138
32	0.468	1.118
33	0.440	1.097
34	0.413	1.078
35	0.385	1.058
36	0.359	1.039
37	0.332	1.021
38	0.306	1.002
39	0.279	0.984
40	0.253	0.966
41	0.228	0.948
42	0.202	0.931
43	0.176	0.914
44	0.151	0.896
45	0.126	0.880
46	0.100	0.863
47	0.075	0.846
48	0.050	0.830
49	0.025	0.814
50	0.000	0.798
60	-0.253	0.644
70	-0.524	0.497
80	-0.842	0.350
90	-1.282	0.195