Chattogram Veterinary and Animal Sciences University

M S in Animal Breeding and Genetics

July-December Semester Final Examination 2023

Course Title: Problems on Quantitative Genetics & Animal Breeding

Course Code: PQB-602

Total marks: 40

Time: 2 hours

(Answer any 2 (one) from the following question. Values are shown in the right margin in each question)

1. a) What is breeding objective? How will you develop the breeding objective from **10.0**
a dairy herd consisting of 20 cows having an average live weight is 325 kg and each
cow produces 3000 liter milk and 120 kg fat per lactation. The per unit price for milk,
fat and meat is Taka 70/-, 650/- and 550/-, respectively.

    b) Estimate the genetic gains for milk yield using the four pathways of selection from **10.0**
a hypothetical dairy herd. Narrate the scenarios if the active cow population will be
doubled than the base population for selecting bull mother; and more than 100 proven
bull is used in artificial breeding purpose.

2. The economic value for skin and live weight of goat is 15 and 350 Taka, respectively.
The breeding objective is to increase the size of skin with the meat yield of goats. Selection
criteria are skin quality and live weight.

	Std. dev.	Skin	Meat	Skin quality	Live weight
Skin (units)	0.22	**0.25**	-0.50	0.55	-0.30
Meat (kg)	11.05	-0.30	**0.36**	0	0.22
Skin quality (mm/cm)	1.02	0.65	-0.10	**0.22**	0.10
Live weight (kg)	2.25	-0.40	0.40	-0.20	**0.30**

Std. dev is the phenotypic standard deviation, Heritability's are on the diagonal, genetic
correlations are below the diagonal, and phenotypic correlations are above the diagonal.

Assume that selection of new parents is based on a single record of their own performance.
Given the above information:

a) State the selection objective and selection index in terms of a linear equation. **2.0**
b) Derive the index weighting factors using the Best Liner equation. **10.0**
c) One goat has a skin quality deviation of +2.0 and a live-weight deviation of **2.0**
-1.5 what is the aggregate genetic merit?
d) Predict the rate of genetic gain in skin quality and goat meat. **2.0**
e) Assume that 5 repeated observations for skin quality are available on each animal **4.0**
are available for selection, and that they each also have 20 offspring assessed for
live weight, derive the normal equations that require solution to obtain BLPs
for the index weighting factors.

3. a) Distinguish between (i) diagonal and off diagonal element, (ii) variance and **4.0**
covariance matrix.
b) Define with example(s): rank, square matrix, generalized matrix, metric trace **4.0**
c) Distinguish between animal model and sire model. **2.0**
d) What is breeding value? Estimate BLUP breeding value by using the assume values
of milk yield of cows in considering both fixed and random factors. **10.0**