

Outline of the course: Genomic analyses with emphasis on single-step

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Day 1:

1. Introduction to BLUPF90 family of programs
 1. Animals model
 2. Multiple trait model
 3. Maternal models
 4. Genomic model
2. Exercise: use of programs for data sets with single and multiple traits.

Day 2:

1. Introduction to genomic selection: simple models
2. Data simulation (including genomics)
3. Methods based on SNP estimation (BLUP_SNP and BayesA, BayesB, BayesC etc.)
4. Exercise: Data simulation.

Day 3:

1. Genomic relationship matrix (G)
2. Creation and handling of genomic relationship matrices with preGSf90
3. GBLUP, GREML and GGIBBBS using blupf90 etc.
4. Exercise: use of above programs with simulated data

Day 4:

1. Theory of Single-step
2. Single-step for populations under selection. Bias, inflation, accuracy
3. Forming Single-step equations
4. Quality control for G
 1. Calling rate
 2. Parental exclusions
 3. Distributions of diagonals of G
 4. Differences between matched G and A22
 5. Heritability of gene content
 6. Elimination of sex and "0" chromosomes
 7. Eigenvalues/eigenvectors – population stratification

5. Exercises: Single-step with simulated data set

Day 5:

1. Practical results with Single-step
2. Experiences and future with ssGBLUP
3. Validation techniques for genomics
 1. R^2 for dairy bulls
 2. Predictability for animals with records
 3. Cross-validation when few genotyped animals with records (e.g., mortality or disease resistance)
 4. Selection bias for in realized accuracies
4. GWAS in Single Step
5. Exercises: GWAS exercises