

LUKE-ADGG HANDSON ON ANIMAL GENETIC AND GENOMIC EVALUATION JOINT COURSE

Training Report 9 to 13th September, 2019 , ILRI Campus, Nairobi, Kenya



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Acknowledgement:

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Introduction

Currently, the African Dairy Genetic Gain (ADGG) (<https://africadgg.wordpress.com/category/adgg/>) operates in two countries: Ethiopia and Tanzania but will be extending her operations to Uganda, Rwanda and Kenya. This course is to develop to strengthen the capacity of the NARS to effectively undertake and manage their respective national dairy and livestock performance recording and genetic evaluation programs with the support of the Natural Resources Institute (Luke), Finland and ADGG. The specific aim of the course was to provide participants with some basic knowledge on computing environment and computational tools that are mostly used by animal breeders, basics of linear mixed models, estimation of variance components and prediction of breeding values. In addition, a hands-on approach was adopted thus providing participants with the necessary skills in post-processing breeding value solutions to build indices, rank top bulls and cows. Finally, non-Bayesian genomic prediction methods were also taught to participants. For the practical session, milk production data, pedigree and genotypic data from Ethiopia and Tanzania were used focusing on data preparation, model definition, genetic parameters estimation and genetic prediction. GBLUP was demonstrated.

Attendants:

The course was attended by 3 participants from Tanzania, 8 from Ethiopia, 2 from Rwanda and 3 from Kenya. Dr. Chinyere Ekine-Dzivenu, a statistical geneticist in the Livestock geneticist team sat in the course and helped with the practical sessions. The participants from Tanzania and Ethiopia were either directly associated with current ADGG activities or sources of support to the DPRCs in each country. Participants from Kenya and Rwanda would be key players as ADGG expands into these countries.

Course Instructors

Dr. Enyew Negussie
Senior Scientist
Natural Resources Institute

Finland

Dr Martin Lidauer
Senior Scientist
Natural Resources Institute
Finland

and

Prof. Raphael Mrode
Principal Scientist, Quantitative Dairy cattle geneticist
ILRI , Nairobi, Kenya and Professor , Quantitative Genetics and Genomics, SRUC, Scotland

Course Facilitators

Mr. Eric Anyona from the Livestock Genetics Team of ILRI, was in charge of all logistics and smooth running of the course with IT support provided by the ILRI IT

Brief outline of proceedings of training course

- Registration for the course commenced on the first day (13th September) from 08:30 until 09.00 by the Mr. Eric Anyona
- The PI for ADGG, Dr Okeyo Mwai then welcomed participants, gave an overview of the objectives and milestones of ADGG and opened the training course
- Dr Enyew Negussie then gave a brief overview of the LUKE, Finland research activities and how it relates the course
- The course outline was presented by Dr Enyew Negussie
- The course then commenced. The main areas covered included introduction to different computing environments, Mixed linear models (Animal, Sire Repeatability models and Test day models), Breeding value/Variance component estimation, genomic selection methods, post-processing and validation of breeding values and the use of EBVs in practice.
- The daily schedule for the training was the presentation of lectures from 09:00 till 10.30 and then practical sessions until lunch at about 13.00. Then after lunch, there was presentation of another lecture followed by practical until about 17.30. The participants worked in groups in the practical sessions using Linux installed in their laptops
- Participants were given opportunities to program in R to manipulate data and undertake pedigree analysis, estimate breeding values and variance components using DMU, Mix99 and Relax
- The last day of the course, all participants received a certificate of attendance and a disk drive with course materials. A feedback form was sent to all participants for the evaluation of the course.

Outputs and Outcomes

Electronic lectures notes on the of linear mixed models, estimation of variance components, prediction of breeding values and genomic selection

A collection of relevant software for participants to undertake genetic analysis

Procedure for the use of Linux environment for computing and data analysis

Procedure for the use of R for data manipulation

Expected outcome

NARS equipped with practical skills in methods for animal quantitative genetics and use of animal breeding tools for effectively manage their respective national dairy and livestock performance recording and genetic evaluation systems

Established network between NARS in Tanzania and Ethiopia in supporting each other in running of the DPRCs in each country

Training of NARS from Rwanda to support their national livestock systems

Main conclusions:

- Participants were brought up to date with methods in quantitative genetics and we feel the expected outputs and outcomes were achieved
- The practical sessions afforded participants to use of several software, to program in R, work in Linux environment and undertake breeding value prediction and estimation of variance components
- Basic skills of programming were also taught and the use of the Unix system
- Participants felt stretched but also felt it was good training for them
- The course afforded an opportunity for networking and future collaboration among participants and lecturers

Other Comments

The feedbacks from the participants were very positive and indicated they have learnt a lot. However, they suggested the following improvements:

- The course period was too short and some suggested 2 weeks
- More time should be allocated to practical sessions
- Indicated that estimation of breeding value will be of most immediate use to them
- Would require more practical on using R and Linux to manipulate data
- Put more emphasis on Genomic Selection
- Include the design of breeding program as part of the course