Work Planning Meeting and Training Course “Gene-based Technologies in Livestock Breeding: Characterization of Small Ruminant Genetic Resources in Asia”

Report

This meeting was held from 13–24 December 2004, at the International Livestock Research Institute ILRI, Nairobi, Kenya. It was held under the framework of FAO/IAEA Co-ordinated Research Project (CRP) entitled “Gene-based Technologies in Livestock Breeding: Characterization of Small Ruminant Genetic Resources in Asia” (D3.10.25).

Ten Research Contract, Agreement and Technical Contract holders, a Consultant and ILRI staff members participated in the meeting.

The objective of this meeting was to develop research plans, define methodologies and the follow up mechanisms for the field work to be undertaken under the CRP. Simultaneously, a training course in the form of theory and practical sessions was also organised. The topics covered were:

1) Case study on ECONOGENE, a European project that integrates genetics, socio-economics and geo-statistics for the sustainable conservation of sheep and goat genetics;
2) Molecular methods to assess genetic diversity of livestock;
3) Sampling sheep and goat for DNA preparation (materials, conservation and processing);
4) DNA preparation methods (DNA analysis and quantification, storage, lab and tag codes, standard operational protocols);
5) Livestock genetic diversity analysis;
6) Group discussion on the CRP work-plan and timetable (selection of markers to be used, definition of reference samples, preparation of the technical guidelines and standard operational protocols – SOPs);
7) Introduction to automatic capillary electrophoresis for DNA sequencing and fragment analysis;
8) Identification of genes by QTL mapping for gastrointestinal parasite resistance in small ruminants;
9) Origin, evolutionary history and genetic diversity of small ruminants in the developing world;
10) Faecal sample collection, long term storage and egg counts, measurement of PCV and parasitaemia;
11) Genetic improvement of small ruminant genetic resources: sustainable delivery strategies and process; and
13) Practical approaches to population genetics analysis of livestock.

In addition to the formal programme, participants were requested to prepare and present a 40-minute country report, describing local characteristics on production, reproduction, health, genetics and socio-economic aspects of sheep and/or goat livestock production.

**Major decisions taken at the work-planning meeting**

1) **Sampling and DNA analysis:** Under the CRP, Around 40 individuals from 150 sheep and goat breeds should be analysed, totalling over 6000 individual samples. Strategies to be adopted for avoiding sampling from related animals were a major issue and were discussed at length. It was agreed to make sampling, as widely spread geographically as possible, in order to guarantee the optimal outputs from further genetic analysis. The sampling should be finished by mid September 2005 and the DNA analysis by December 2005.

2) **Molecular Markers:** ISAG/FAO panel of microsatellite DNA markers will be applied in the first co-ordinated activity. These recommended markers will be used in order to allow data comparison with other data obtained from similar initiatives (ECONOGENE - Europe and ILRI - Africa). Other markers or technologies would possibly be introduced in 2006, and the topics to be decided at the first RCM (tentatively planned for September-October 2005 in Indonesia).

3) **Definition of reference samples:** Reference DNA samples will be prepared in large amounts from specific individuals to be used across the laboratories in order to correctly call the allele sizes from independent experiments, permitting the correct joining of different data sets. Ideally, a set of reference samples should cover all the allelic variations found for each marker in each single species. The need to establish
‘internal’ and ‘external’ reference sample banks was realised and will be performed during 2005.

External DNA reference samples will be used to link the CRP data with ECONOGene and ILRI (Africa). ECONOGene will provide DNA from 10 sheep and 10 goats that will be used as reference samples in the CRP. ILRI will use the same approach with ECONOGene. Internal DNA reference samples will be prepared in order to access the allelic variability of Asian breeds (which could be different from the European ones). An internal DNA reference bank will be established. The definition of samples (origin and number) to be included in this reference panel will be decided after the first analysis of the selected breeds.

4) Preparation of the technical guidelines and standard operational protocols (SOPs): The Animal Production and Health Sub-programme of the Joint Division will be responsible for preparing the report of the work planning meeting, adapting and validating DNA preparation protocols, writing the guidelines and SOPs and submitting them to the group for comments, corrections and implementation.

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