# Capacity Building for Sustainable Use of Animal Genetic Resources in Developing Countries

## Progress Report 1999–2003





ILRI
INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE

International Livestock Research Institute

SWEDISH UNIVERSITY OF AGRICULTURAL SCIENCES
SLU

Swedish University of Agricultural Sciences

# Capacity building for sustainable use of animal genetic resources in developing countries

ILRI–SLU Project

Progress report for the period 1999–2003

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# Summary

To promote a sustainable and improved use of animal genetic resources in developing countries, ILRI in collaboration with the Swedish University of Agricultural Sciences (SLU), and supported by Sida (Sweden), launched a project *training the trainers*, for national agricultural research systems (NARS) scientists (national university teachers and researchers) in developing countries. The main objectives of the project were to strengthen subject knowledge and skills, and teaching and communication skills of scientists teaching and supervising students in animal breeding and genetics at least up to MSc level. Other objectives were to catalyse curriculum development, stimulate contacts and networking, and to develop computer-based training resources relevant for use by NARS scientists in teaching and research. This capacity building project was an integrated component of the ILRI research agenda on Animal Genetic Resources. It was also an endeavour by ILRI to collaborate with and strengthen NARS institutions and scientists.

The project was initially planned to include regions in sub-Saharan Africa, South-East Asia and South Asia, resources allowing, Latin America. The activities in each region or sub-region included:

planning activities (questionnaire, country visits, planning workshop)
training course for university teachers and researchers (three weeks, combining training in animal genetics/breeding and teaching methodologies)
development of an 'Animal Genetics Training Resource' (on CD-ROM, and later also on the Web)
follow-up activities, including impact assessment (questionnaires and follow-up workshops).

During the period 1999 to 2003 a full round of activities was completed for sub-Saharan Africa. The training course was conducted for Eastern/Southern Africa (20 scientists from 10 countries) and for Western/Central Africa (18 scientists from 10 countries). The planning and follow-up workshops were performed jointly for the region. In addition, the planning activities and training course (18 scientists from 9 countries) were completed for South-East Asia. Version 1 of the computer-based training resource (CD) was released in late 2003. The resource contains *Modules*, i.e. core texts on issues related with farm animal genetic resources, quantitative methods and teaching methods, and *Resources* containing case studies, breed information, maps, examples, exercises, video clips, a glossary and a virtual library. It also contains references to web links, books and other CDs. The participants found the training courses very useful; average score for 'Overall Impression' was 8.2 (scale 1–9). They also indicated that the computer-based training resource would be a valuable tool both in teaching and in research, but had not yet had a chance to explore and use it fully.

Impact assessments for Africa (questionnaire and follow-up workshop) showed that the training course has already had a substantial impact in many of the participants'

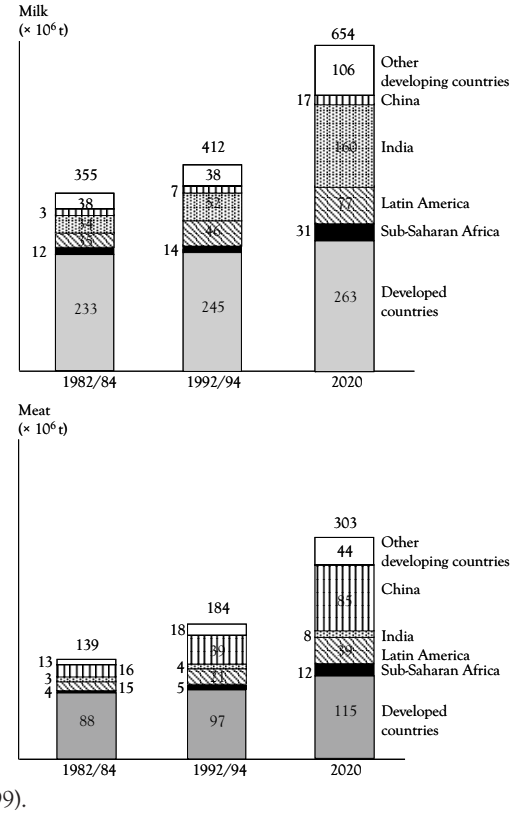
home institutions, both on teaching methods and on course content. Students have shown more interest and understanding of animal breeding and genetics. The impact on participants' research has been just as large; more focus on research involving indigenous animal genetic resources, improved research proposal writing, research methodologies and science communication skills, and also more efficient supervision of students' research. Many of the participants have actively disseminated materials and experiences from the course to colleagues in their home institutions. Other important outcomes have been increased contacts and an open e-mail network 'Afrib' formed by the African course participants. The project also strengthened Swedish knowledge and expanded PhD activities on animal genetic resources in developing countries; these were valuable 'spin-off effects' of the project.

The 'training the trainers' approach adopted in the ILRI–SLU project seems to be a good model for effective capacity building to promote a sustainable use of animal genetic resources in developing countries. The approach was innovative and has functioned well; the model could be extended to other disciplines. Furthermore, linking universities from the North to those of the South, with a CGIAR institute playing both a facilitating and catalytic role was beneficial. The project will now proceed to South Asia and version 2 of the computer-based training resource will be developed. More impact analyses will also be performed.

# Background

## Increasing demands for food of animal origin

Farm animal genetic resources (FAnGR) are among the most valuable and strategically important assets that a country can have. Domestic livestock production is crucial for sustainable agricultural production systems and for future food security and poverty alleviation in developing countries. FAnGR contribute significantly to the world's economy and play a vital role in sustaining the livelihoods of many pastoral and agro-livestock systems, especially in developing countries. It is estimated that FAnGR provide up to 30% of the total human food and agricultural production requirements worldwide (FAO 1999). The demand for food of animal origin is increasing rapidly in developing countries (Figure 1), more rapidly than the increase in production; therefore, a Livestock Revolution is needed (Delgado et al. 1999). This, however, provides a serious challenge to the poor livestock keepers of the developing world: will this food be produced by them or by industrialised agriculture elsewhere?




Source: Delgado et al. (1999).

**Figure 1.** *Total milk and meat consumption during 1983 and 1992 and projection for 2020.*

The rising demand for food of animal origin and other livestock commodities has, to a large extent, been met by increasing the number of animals. This cannot continue because it often results in underfed animals, and the concomitant problems, and in land degradation. What is needed is improved *productivity per animal* and per unit area of land.

# Importance of livestock and animal genetic resources in developing countries

FAnGR play multiple roles in many economies (Rege and Gibson 2003). In the rural areas of developing countries FAnGR provide a year-around flow of essential food and other products (hides and skins), employment, income, draft power and manure for crop production. Food from livestock and poultry such as milk, meat and eggs are rich in energy, protein, vitamins and micronutrients, which are particularly important in the diets of the most vulnerable groups, i.e. children and pregnant and breast feeding women.

In developing countries malnutrition is common, especially among the most vulnerable groups. Meat, milk and eggs therefore provide an important opportunity to overcome this (Perry et al. 2002). For example, studies conducted in the Sudan by Vaughan et al. (1981); in Mexico by Alien et al. (1991); India by Alderman (1994); Malaysia by Chen (1989); Kenya by Nicholson and Thornton (1999) and in many other developing countries by the World Bank (2002) have demonstrated the beneficial roles of foods of animal origin in the improvement of growth and health of children.

Other roles of livestock such as production of hides, skins, wool and manure, environmental health, storage of wealth, and socio-cultural functions and traditions have been discussed in some detail elsewhere (FAO 1994; Rege and Gibson 2003). It is estimated that more than 70% of the world's rural poor derive their livelihoods from livestock; this includes 194 million pastoralists and graziers, 678 million mixed farmers and 107 million landless livestock keepers (Livestock in Development 1999). Empirical evidence of the contribution of livestock to sustainable livelihoods of the world's rural poor exists, including the potential for improvement of such livelihoods through investment in livestock development in all the developing regions of the world (Delgado et al. 1999; ILRI 2000; Perry et al. 2002; World Bank 2002; Anderson 2003).

# Indigenous animal genetic resources at risk

High yielding exotic livestock breeds have been introduced in developing countries for pure breeding and crossing with indigenous breeds to increase productivity and food production. This practice has been successful in some instances, e.g. in some highland

areas, in maritime climates and in relatively intense peri-urban production systems, but has mostly failed. Several reasons could be advanced for these failures:

Exotic breeds usually require high inputs and intensive care and management and are not specifically adapted to harsh environments found in developing countries. When used in environments that cannot support their needs the result is often low production levels, decreased fertility and increased livestock disease and mortality. Many countries have indigenous animal species and breeds that could potentially contribute far more to food and agriculture production than they currently do, and also meet much wider human needs (FAO 2004). Besides, indiscriminate use of exotic breeds has resulted in an erosion of the indigenous breeds.

Lack of domestic resources and adequately trained staff in the field of animal breeding and genetics. Breeding programmes, therefore, have usually been designed and implemented by expatriates. As a consequence, sophisticated methods, e.g. use of artificial insemination and progeny testing, have often been inappropriately applied, without regard to the costs and support infrastructure needed for such methods or to their sustainability.

Crossbreeding with exotic breeds without a long-term plan on how to maintain a suitable level of 'upgrading' and how to maintain the pure indigenous breeds for future use in crossbreeding. Levels of exotic genes that are too high in the upgrades have generally resulted in animals without resistance to local diseases and environmental stress.

Lack of or incomplete analysis of the different roles that livestock play in each specific area, usually leading to inappropriate and unsustainable breeding objectives, insufficient recording of livestock traits, and neglect of the potential and real value of various indigenous livestock breeds.

Indigenous livestock breeds of various species have been adapted over many thousands of years to local environmental conditions and have demonstrated their superiority to survive and produce in harsh tropical environments. Some genotypes have proven to be more adapted to certain environments than others. Thus, a wide variety of species and breeds are needed to fit present and future environmental conditions. This genetic variability provides the basis for any future development.

The global situation on domestic animal diversity is critical: about 30% of the world's livestock breeds are currently under threat of extinction; a large proportion of these are found in developing countries. There are no conservation programmes for more than 75% of the threatened breeds. The United Nations Convention on Biological Diversity (CBD) of 1992 emphasised the need to conserve the world's biological diversity, including FAnGR, for present and future use. In 2001 FAO launched a global programme to monitor animal genetic resources, analyse their status and support the development of national or regional action plans, including conservation schemes. To successfully undertake these schemes, in-depth knowledge of the key players in the area of conservation of animal genetic resources is essential.

# Human capacity building on animal genetic resources needed

Development and implementation of genetic conservation and livestock improvement programmes is far more complex in developing countries than in temperate climates of the developed world. The limited number of trained animal genetics and breeding scientists in many developing countries is therefore a big problem. In addition, few relevant training resources are available in these countries (Malmfors et al. 1994; FAO 1997). Educational efforts at all levels, i.e. among teachers, students, policy makers, administrators, geneticists and breeders, are necessary to improve both the awareness of the problems and the methods to be chosen for effective conservation and improvement programmes in developing countries. Furthermore, relevant research in tropical environments, using both modern science and 'indigenous' knowledge is necessary.

The important role that scientific research plays in the overall economic development of nations needs no emphasis. Science affects both what can be achieved through agricultural research and how it is achieved. However, the pace of global scientific progress and development of *new* knowledge are increasing so rapidly it is no longer enough to just hold a degree. Each degree holder must continuously update his/her knowledge (Figure 2). Access to new global information through scientific journals and the Internet would be beneficial to this process of life-long learning, but the availability of such resources is still quite limited in many developing countries. Opportunities to participate in international conferences and continuing education courses are also scarce.

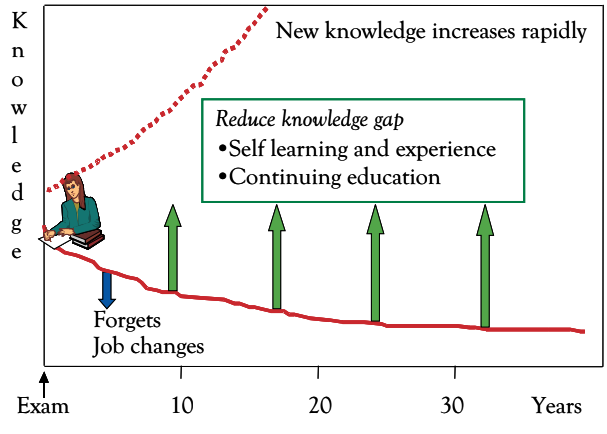



**Figure 2.** *Life-long learning is essential.*

Most of the highly trained and experienced researchers in developing countries are based at national universities and research institutions (NARS), where facilities are used for both teaching and research. With sufficient facilitation and motivation, these insti-

tutions could effectively generate relevant agricultural technologies which, if adopted by farmers, would lead to improved farm productivity and farmers' livelihoods, more so where universities and research institutes collaborate and complement each other (Janssen and Braunschweig 2003; Michelsen et al. 2003a; Michelsen et al. 2003b). National universities and national agricultural research institutes are the primary source of current and future generations of national researchers, teachers and policy makers and are therefore the 'engines' for capacity building for sustainable food production in developing countries. However, in spite of the fundamental role of higher education and research in supporting development, the higher education institutions in many developing countries are chronically under-funded and face many obstacles (World Bank 2000). Some of the main problems that higher education in developing countries currently faces are:

heavy teaching loads
limited facilities for hands-on practical research
limited training in the use of a variety of teaching methods required to cope with new knowledge
unpredictable future circumstances and
lack of sufficient and relevant teaching materials.

The lack of relevant teaching materials underlines the problem. Many of the teaching resources use examples and case studies from developed countries, which are irrelevant and often confuse the concepts or principles being presented.

Conservation and sustainable use of FAnGR in developing countries is an example of an area where teaching and research are given too little emphasis, or are sometimes neglected altogether, worldwide. This results in low awareness of the need to develop appropriate breeding programmes for domestic animals in developing countries, and prevents poor livestock keepers from benefiting from the projected Livestock Revolution. Animal genetics, especially sustainable breeding programmes and animal genetic resources conservation, need to be given greater emphasis in university curricula and in research, and NARS scientists need opportunities to strengthen their subject knowledge and skills in this area. Specifically, the teaching methods need more attention given that animal genetics is a subject that students quite often perceive as being theoretical and difficult to understand. It is therefore a challenging task to find the best approaches to facilitate students' understanding of the subject.

Ideally, teaching and research should always be interlinked in higher education. Insufficient links between teaching and research may not only reduce the level and quality of higher education, but may also hamper recruitment of new scientists, which in turn reduces the understanding and support for research and capacity building in society. There are, however, many universities in developing countries where teachers have limited opportunity for research. Opportunities must therefore be provided for university/college teachers to be active both in teaching and in research, and for scientists at research institutes to be involved in teaching and supervision of students.

To promote a sustainable and improved use of animal genetic resources in developing countries, ILRI in collaboration with the Swedish University of Agricultural Sciences (SLU), and supported by Sida (Sweden), launched a project aiming at strength-

ening higher education (teaching and research) in animal breeding and genetics. The project activities and progress achieved in the period 1999–2003 are presented in this report.

# ILRI–SLU capacity building project: A new approach

## Project idea

Development projects for human capacity building in developing countries often focus on training MSc and PhD students. The main idea of the ILRI–SLU project, however, is training the trainers, i.e. the NARS scientists responsible for research on and training of animal breeding and genetics to students at BSc, MSc and PhD levels in developing countries (Figure 3). This should have a large impact because each teacher/researcher given refresher training within the project would, with the improved knowledge, awareness and skills, reach out to a large number of students and colleagues in his/her home institutions. The effect is thereby multiplied because students use and further spread the knowledge during their professional careers.

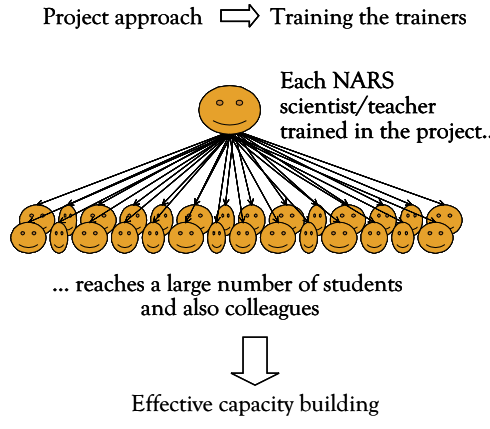



**Figure 3.** *Illustration of the project idea.*

## Objectives

The overall objective of the ILRI–SLU project was to implement a 'training the trainers' model for building human capacity for the conservation and sustainable use of animal genetic resources in developing countries, thereby contributing to food security and poverty alleviation.

The specific objectives of the project were to:

strengthen subject knowledge and skills of NARS scientists in teaching, research and supervision of animal breeding and genetics

strengthen communication skills of these teachers and researchers
catalyse curriculum development, review of course contents, and use of new and expanded teaching methods in university education
develop computer-based training resources relevant for use by NARS teachers and researchers
stimulate contacts and exchange of experiences and ideas between teachers/researchers from developing countries on research and training of students in animal breeding and genetics
strengthen the human capacity base of the project partners for work on animal genetic resources in developing countries.

The project should be an integrated and essential part of ILRI programmes on animal genetic resources and part of ILRI's endeavours to strengthen NARS institutions in this area of work. The project was expected to have immediate impact, because the trained NARS scientists would immediately use the up to date techniques in animal breeding and genetics to design more appropriate research and conservation programmes thus ensuring sustainable use of farm animal genetic resources in their respective countries. Furthermore, because of improved university teaching, access to new and diverse information sources, and the large number of students reached by the trained scientists, this model for capacity building would substantially increase awareness and knowledge among future key players (teachers/researchers, farm advisors, policy makers etc.) in the area of animal genetic resources in developing countries.

# Personnel and organisation structure

Scientists M. Smalley and B. Malmfors of ILRI and SLU, respectively, jointly initiated the project. In 1998, ILRI developed a proposal to Sida/SAREC for funding; Sida/SAREC increased its contributions to ILRI by 2.5 million SEK, which enabled ILRI to implement this project. The detailed project plans were finalised in 1999. ILRI contracted SLU (Department of Animal Breeding and Genetics) to collaborate in conducting the project. A first phase was scheduled to take place during 1999–2003. The outcome of this phase would determine the future developments of the project.

Currently the core team at ILRI consists of Drs Okeyo Mwai, Ed Rege and Olivier Hanotte, supported by web designer Mr Richard Fulss. Dr Markos Tibbo and Mr Senai Aseffa provide assistance. Initially the team comprised Drs Michael Smalley, Ed Rege, Habib Ibrahim and Ntombizakhe Mpofu, with Mr Samson Bekele as the web designer. At SLU Dr Birgitta Malmfors has been project leader since the beginning of the project with Drs Lena Andersson-Eklund and Jan Philipsson as co-workers.

To develop courses and training resources the participation of scientists and university faculty of many NARS in sub-Saharan Africa and South-East Asia has been essential; so also was the support from the Food and Agriculture Organization of the United Nations (FAO), the International Committee for Animal Recording (ICAR), the United States Agency for International Development (USAID) and Cornell University, and the

contribution by reviewers of materials produced in the project. Furthermore, course and workshop participants (see Appendix 1) made valuable contributions to this phase of the project.

# Project activities

## Overview of the project activities

The project primarily targets teachers and researchers in developing countries who are actively involved in teaching animal breeding and genetics at BSc, MSc or PhD level, including supervision of research. Scientists from universities/colleges and from research institutes are targeted to stimulate national collaboration in teaching between such institutions.

The project included a number of activities, an overview of which is presented in Figure 4. The main activities were:

planning activities
training courses
development of computer-based training resources and
follow-up activities, including evaluations of impact.

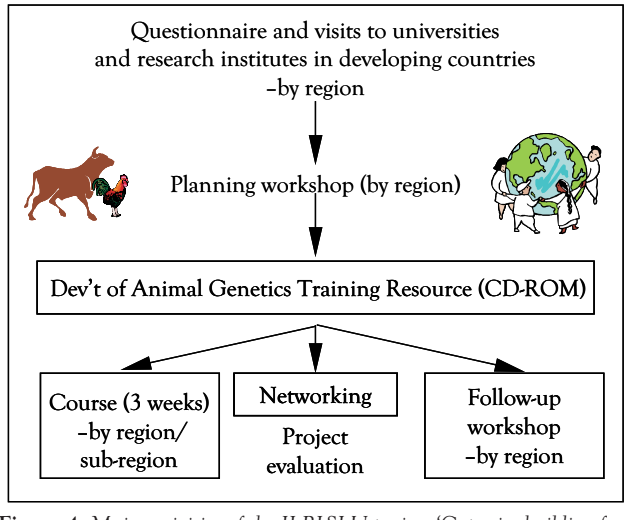



**Figure 4.** *Main activities of the ILRI-SLU project 'Capacity building for sustainable use of animal genetic resources in developing countries'.*

The project strove for and embraced demand driven and participatory approaches to best satisfy the needs of the target groups.

Each of the activities were performed on a regional basis to create contacts between scientists/teachers in countries that are not too distant from each other and hence have much in common, and to better address local needs. The project was planned to include the following regions:

Sub-Saharan Africa (split into East-South and West-Central sub-regions)

South-East Asia
South Asia
Latin America.

One round of activities (i.e. planning, training course, development of training resource and follow-up) was completed for sub-Saharan Africa by the end of 2003. The planning and the training course activities were completed for South-East Asia, and plans for the South Asia region were initiated.

# Planning activities

Much emphasis was given to planning and fact-finding activities to:

involve the target group from the very beginning
assess strengths and opportunities, and weaknesses and constraints in higher education and research in animal breeding and genetics within the different regions
assess the existing level of human capacity, teaching resources and ongoing research in this subject area
identify the interests and scope in strengthening knowledge and skills among NARS teachers/researchers.

The planning activities were performed by region and included sending out a questionnaire, making country visits, and holding a planning workshop.

## Questionnaire and country visits

The first planning activity within a region was to send a *questionnaire to universities, colleges and research institutes* (see appendix 2). Within each region the questionnaire is sent to all countries and institutions involved in postgraduate (mainly MSc) training and research in animal science/animal breeding and genetics. Questions were asked about teachers (their numbers and qualifications), courses and contents, areas that would need to be strengthened and limitations for doing this, teaching methods, teaching materials and facilities (e.g. libraries and computers), and numbers of students. There were also questions on interest to contribute to development of other teaching materials, such as case studies. In the period 1999–2003 questionnaires were sent out and processed for sub-Saharan Africa and South-East Asia (Table 1).

**Table 1.** *Questionnaires sent out to assess conditions in teaching animal breeding and genetics.*

| Region | Year | Number of countries covered | Total number of questionnaires sent out | Number of replies |
|---|---|---|---|---|
| Sub-Saharan Africa | 1999 | 9 | 53 | 24 |
| South-East Asia | 2002 | 4 | 24 | 12 |

To further increase our understanding of the conditions in higher education and research in animal breeding and genetics members of the project team made some *country visits*. A sample of countries, universities and research institutes were visited; farm visits were also made. The visits were planned to reflect the variety of conditions. In the 1999–2003 country visits were carried out in sub-Saharan Africa and in South-East Asia (Table 2).

**Table 2**. *Countries and institutions visited by members of the project team in the period 1999–2003.*

| Region/country | Year | University/college (including university farms) | Research and other institutions | Private farms–type of farm |
|---|---|---|---|---|
| Sub-Saharan Africa | | | | |
| Ethiopia | 1996–2001 | Alemaya University | EARO<br>AI centre (Kaliti)<br>ILRI–Debre Zeit | Dairy (including peri-urban)<br>Beef; Sheep |
| Kenya | 1999 | University of Nairobi | CAIS–Kabete | Maasai village |
| Uganda | 1999 | Makerere University | MUARIC; NARO; AI centre | |
| Tanzania | 1999 | Sokoine University | AI centre | |
| Zimbabwe | 1999 | University of Zimbabwe | Matopos | Nguni cattle |
| South Africa | 1999 | Pretoria University | Irene; AI centre | |
| Lesotho | 1999 | University of Lesotho | RIs sheep and pony<br>Livestock Production Services | |
| Ghana | 2001 | University of Ghana | CSIR–ARI | Dairy |
| Senegal | 2001 | EISMV | ISRA–LNERV; Livestock Services | Sheep (urban) |
| South-East Asia | | | | |
| South China | 2002 | Yunnan Agricultural University; | Extension station | Pig; Dairy; Beef; Poultry |
| | | South China Agricultural University | Livestock services<br>Guangdong Institute of Animal Science | Poultry–Fish |
| Vietnam | 2002 | Hanoi Agricultural University | NIAH (+ pig, cattle, sheep, goat/rabbit, poultry)<br>AI centre (MAIC) | Poultry; Dairy |
| Lao PDR | 2002 | NUOL–Faculty of Agriculture | Livestock Services; NAFRI<br>Pig breeding station | Pig; Dairy |
| Thailand | 2002 | Universities: Kasetsart, Mahidol and Chulalongkorn | Livestock Development Services; FAO Kampangsan beef station | Water buffalo; Beef<br>Fighting cocks |

Several major issues concerning higher education and research in animal breeding and genetics were revealed from the questionnaires and the visits in sub-Saharan Africa and South-East Asia. These were:

*Staff:* Few teachers in animal breeding; great need for updating their skills, especially in biometrics, applications of molecular methods, and in design of sustainable breeding programmes; lecturers usually lacked training in teaching methodologies, but were enthusiastic to teach, although variably motivated, depending on the country.

*Facilities:* Computers often available for MSc students, but limited access for BSc students; poor Internet connections in many places; recent journals often lacking in library; few textbooks available; little material relevant to developing countries; lecture rooms often poorly equipped.

*Teaching*: Heavy load of undergraduate teaching; large student groups in BSc, small in MSc; decreasing numbers of students specialising in animal breeding; great variation in quality and relevance of curricula and course contents; lectures predominate and not enough practical classes; teaching materials limited.

*Research:* Teachers often lack time and money to do research; limited access to data for animal breeding research at universities; few national livestock recording systems, or only for exotic breeds; little attention to research on characterisation of indigenous breeds; scientists at research institutes often have better conditions for research, but usually limited participation in teaching and supervision of students.

*Collaboration:* Need for collaboration between universities and research institutes recognised, but not always practised; limited collaboration between universities, both within and between countries.

All 'characteristics' listed above were not relevant for every country or institution visited. There was also some variation between regions, and there was often a rather large variation between countries within a region.

## Planning workshop

To make the training course and the training resources as relevant as possible for the target groups, a three-day planning workshop was organised for each region. Leading NARS scientists in animal breeding and genetics were invited to the workshop, with members of the ILRI–SLU project team. In Asia representatives from FAO also contributed in the workshop. Two planning workshops have been conducted so far:

One for sub-Saharan Africa in January 2000 at ILRI–Addis Ababa (in total 25 participants, of whom 17 were from 13 countries in sub-Saharan Africa)

One for South-East Asia in February 2002 at Kasetsart University, Bangkok (in total 32 participants, of whom 25 were from 9 countries in South-East Asia).

During the regional planning workshop the experiences from questionnaires and country visits were reported, and the needs for higher education and research in animal breeding and genetics in the actual region were thoroughly discussed. Emphasis was given to opportunities to strengthen graduate teaching and research on animal genetic resources, and to ways of making these activities more relevant and responsive to

national needs in the region. The NARS scientists had extensive discussions on relevant contents for the regional training course and the selection of participants. Discussions also focused on the training resources, and on possible contributions from the region to case studies, breed information etc.

# Training course

The regional three-week training course was the most important activity for creating awareness among university teachers and researchers in developing countries about the needs and methods to improve higher education and research on animal genetic resources. The course also stimulated contacts and networking between the teachers and researchers in the region covered, and with ILRI.

So far, there has been a three-week course for NARS scientists for three different regions/sub-regions. Teachers and researchers in animal breeding and genetics from sub-Saharan Africa were split into two courses, while one course was given for South-East Asia. The number of NARS scientists and the countries represented are shown in Figure 5.

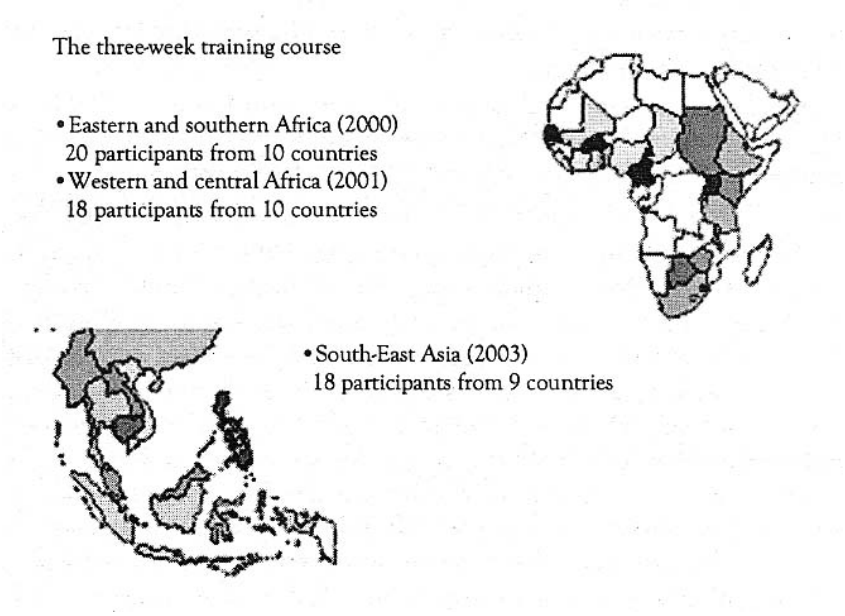



**Figure 5.** *Countries represented (shaded) in the training courses given in 2000–2003.*

The two courses for Africa were both conducted at the ILRI–Addis Ababa campus in Ethiopia, while the course for South-East Asia was conducted at Kasetsart University in Bangkok, Thailand. The course language was English; speaking and writing English was a prerequisite for participation in the course.

The number of participants in each course was limited to 20–25, partly depending on availability of computers for exercises, but also due to lack of animal breeders in the region. The aim was to have at least two participants from each invited country, and also that both universities/colleges and research institutes were represented in the course. The aim was also to have some gender balance, but it was only possible to recruit a few female participants in each course. Members of the project team were the main course facilitators, but for some parts of the course, participants also contributed as course facilitators.

In brief, the training course covered:

1. importance and role of animal genetic resources for sustainable agriculture in developing countries
2. characterisation of indigenous farm animal genetic resources, and design of sustainable breeding programmes
3. methods for genetic analyses in teaching and research
4. computer exercises: use of software, databases and Internet searches
5. group project work with design of conservation programmes for indigenous breeds
6. field visits
7. teaching methods, including aspects on teaching and learning, examination methods, supervision of students' research, and how to stimulate educational development at universities
8. science communication, such as scientific writing (including writing popular science and research proposals), oral presentation (to help with self evaluation, each participant was videotaped) and poster presentation
9. review of structure and content of training resources being developed by project.

The combination of animal breeding and teaching methodologies made the course unique. A number of teaching methods were practised during the course; the approach was interactive, giving many opportunities for discussion and exchange of ideas and experiences. Computer laboratories, information searches, and the project work on sustainable use of indigenous animal genetic resources played an important role in the training courses. An example of a schedule for the training course is given in Appendix 4.

A lot of material was distributed during the course: lecture handouts, chapters covering the main course topics, text books on science communication, case studies, exercises, animal breeding tutorial (CD) and various CDs produced by ILRI and FAO. The Animal Genetics Training Resource produced in the project (see next sub-section) was until late 2003 only available in test versions, but will be used as a course material in future courses. Much of the material produced was the result of consultations at the planning workshop and with course participants.

Each participant did a course evaluation at the end of every course. A mid-course evaluation (partly written, partly oral) was also undertaken, so that any views and issues on the course could be captured and dealt with while the course was still in progress. The course participants also completed a 'Course follow-up evaluation form', where they

indicated what they would try to implement at their home institutions. This was followed up on an individual basis during the impact analyses conducted after the course.

## Animal Genetics Training Resource (computer-based)

The lack of literature and course materials on animal genetic resources relevant to developing countries prompted the development of a computer-based Animal Genetics Training Resource. The training resource was produced not only for the course participants, but also for other university teachers and researchers in this field for use in their teaching, in their research, and in updating their own knowledge. The first version of the Animal Genetics Training Resource was released in October 2003 (Mwai and Malmfors 2003). It was produced on a CD, as access to the Internet is currently expensive and not very effective in many developing country universities. The product is, however, web-enabled, and later versions will be produced both on CD and on the Internet. The main contents of the Animal Genetics Training Resource are split into 'Modules' and 'Resources' (Figure 6).

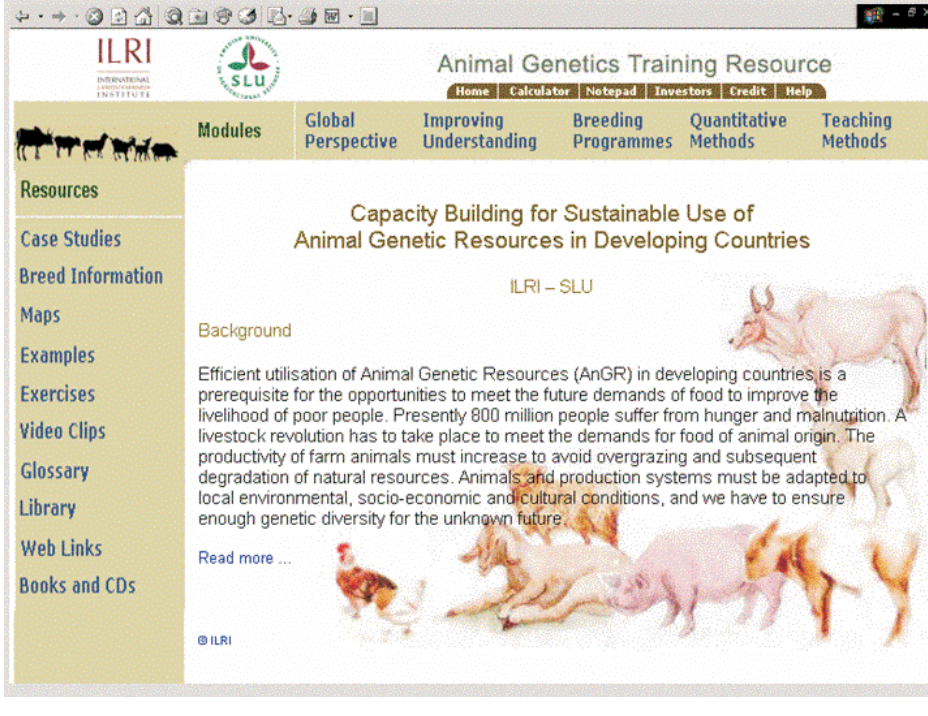



**Figure 6.** *Home page of the Animal Genetics Training Resource (version 1) produced within the ILRI–SLU project.*

Materials in the training resource may be printed and copied for students and may also be used as visuals in lectures and other oral presentations. Whenever whole or parts of the training resource are used, however, due recognition of copyright and correct citation must be made.

## Modules

Modules form the 'core' of Version 1 of the training resource; they present concepts and principal ideas. The purpose is to give a holistic view of farm animal genetic resources in developing countries seldom found in textbooks. One module is devoted to teaching methodologies. The modules included are an introduction—albeit a comprehensive summary—to the following topics:

1. global perspectives on animal genetic resources for sustainable agriculture and food production
2. improving our knowledge of tropical indigenous animal genetic resources
3. sustainable breeding programmes for tropical farming systems
4. quantitative methods to improve the understanding and use of animal genetic resources
5. teaching methods.

A comprehensive list of relevant references is included in each module. Within the module texts there are links to contents of the *Resources menu*, i.e. case studies, examples, exercises, breed descriptions etc. that are related to the module content. There are also links to the other modules, and to relevant resources on the Internet. Module texts are presented both in HTML and PDF file formats, but the links are only active in the HTML files.

## Resources menu—Case studies

The case studies are essential materials for the training resource because they provide practical experiences of local or regional activities in animal breeding and genetics. They provide examples where investigations or procedures worked and where they did not, and why. The case studies illustrate concepts in the modules and can be very useful in teaching; they also contain literature references and links to related breed information, exercises and other resources. Identified knowledge gaps and discussion questions form important parts of the case studies and might be useful topics for student research and group discussions. Most case studies included in version 1 of the training resource are from sub-Saharan Africa.

The case studies were produced jointly with NARS scientists in different regions; this valuable contribution was highly appreciated. There were 18 case studies produced for version 1 (Appendix 3). In addition to these, 13 case studies published in ICAR Technical Series No. 3 are also included in the training resource with permission from ICAR.

## Resources menu—Other contents

The Animal Genetics Training Resource contains several other resources of value for teaching and research. There is a *Breed Information* database where all breeds mentioned in the modules or case studies are included with a detailed description and a photograph, and there are *Maps* showing the distribution of breeds (so far for Africa). A few *Video Clips* show indigenous livestock, and *Animated Examples* illustrate some studies in cattle. *Examples on Biometrics* demonstrate statistical analyses widely used in animal breeding. There are also a number of *Exercises* for use in teaching, all with the purpose of improving students' understanding and learning; these include manual exercises, computer exercises, and questions for group discussions. Literature mentioned in modules, case studies etc. is found with full reference (including abstract when possible) in the *Virtual Library*; whenever possible the full text is included. There is a *Glossary* where a number of terms related to animal breeding and genetics are explained, and also French translations of English terms. Furthermore, the contents of the computer-based training resource are widened through numerous *Web Links* to databases (e.g. DAD–IS and DAGRIS), software, course notes, organisations and networks, and bibliographic databases on the Internet. References to relevant *Books and CDs* are also given.

## Peer-review of the training resource

The project's team of experts checked the module texts, case studies and all other resources for accuracy, content and clarity of presentation before they were incorporated into the training resource. Thereafter external subject matter specialists independently reviewed the materials. The training resource was also pre-tested and lightly evaluated during the construction by groups of potential users. For example, in the two training courses for sub-Saharan Africa the participants used many of the exercises produced for the training resource, and reviewed the modules and case studies. Participants of the South-East Asia training course in January 2003 tried out a test version of the Animal Genetics Training Resource CD. Suggestions for improvements were incorporated into the final version.

# Follow-up activities

Follow-up activities were used to evaluate the impact of the ILRI–SLU capacity building project, and to stimulate and give feedback to the project team, and to the representatives of the target groups.

A *Follow-up* Workshop was organised 2–3 years after a training course was conducted in a particular region. The purpose was to gather representatives of previous course participants to discuss what direct impacts the ILRI–SLU project had, and to exchange experiences in the process of implementation of new concepts or ideas in the home countries of the participants.

Impacts of the ILRI–SLU project were partly assessed through questionnaires, the first one before the follow-up workshop. In September 2003, an *Impact Assessment Questionnaire* (Appendix 5) was sent to all the 38 previous participants of the two training courses given for Africa. The questionnaire covered aspects on teaching and research.

The first follow-up workshop was held in Addis Ababa for 4 days in November 2003, bringing together 20 previous course/workshop participants from 18 countries in sub-Saharan Africa and members of the project team. The workshop programme included thorough discussions on the impacts to date of the ILRI–SLU capacity building project on:

teaching methods
curriculum development and course contents
research and research supervision.

Attempts and achievements made by the participants were presented, and the results, experiences, constraints, solutions and ways forward were discussed together with the summary of all the responses to the follow-up questionnaire. The workshop programme also included an evaluation of the computer-based Animal Genetics Training Resource (version 1). Furthermore, ongoing projects in animal genetic resources were presented for all countries represented in the workshop, and by ILRI. There were also sessions on the FAO-led State of the World's Animal Genetic Resources Report, and on Intellectual Property Rights. The last day mainly included discussions on how to further improve university teaching and research, and networking in animal genetic resources in Africa. The impacts of the training course, as reported by the African participants, are presented and discussed in the section 'Impact and experiences'.

# Participant evaluations of project activities

The participants evaluated each training course and follow-up workshop. Evaluation results from three course events, and from the first follow-up workshop are presented below. Results from a brief evaluation of version 1 of the computer-based training resource (CD) are also given.

# Evaluation of training course and follow-up workshop

## Course evaluation results

At the end of a training course, participants individually completed a course evaluation form and engaged in an oral discussion about the course. In addition, participants indicated what they would try to implement from the course. In the written evaluations the participants scored various items on a scale from 1 to 9 (where 1 = not good or not useful; 9 = very good or very useful); they also wrote comments. The evaluations showed that the participants were pleased with the courses given so far; the average scores for *Overall Impression* are given in Table 3.

**Table 3.** *Participants' evaluation of the training course (scale 1–9, where 9 = very useful).*

| | Region and year | | |
|---|---|---|---|
| | Eastern/southern Africa | Western/central Africa | South-East Asia |
| Grading | 2000 | 2001 | 2003 |
| Overall impression, average score | 7.7 | 8.5 | 8.4 |

Participants reported increased awareness and improved knowledge and skills in animal breeding and animal genetic resources, both for teaching and for research. They also highly appreciated the training in teaching methodologies; in fact, many of the participants had not previously received any such training. Participants found the course facilitators well prepared, easy to understand, and well versed in the subjects taught. Furthermore, they underlined that it was a good atmosphere for discussion and exchange of ideas and that the course had been instrumental in bringing the experiences of different countries together. Most participants indicated that they thought the course

would have much or very much impact on their teaching (methods and content), and on their research, research supervision and networking.

## Follow-up workshop evaluation results

The follow-up workshop organised within the project gathered representatives of the courses for sub-Saharan Africa. Evaluation results showed that the follow-up workshop was highly appreciated; 90% of the 20 workshop participants gave the score 7, 8 or 9 for 'overall impression'. They stressed that it was enriching to meet colleagues from East, West, South and Central Africa, and to share experiences on efforts to improve teaching and research since the training course. They also underlined the need for an additional follow-up workshop after some years, and, if possible, an opportunity to share experiences with colleagues in Asia.

# Evaluation of the computer-based training resource

Version 1 of the Animal Genetics Training Resource was released shortly before the follow-up workshop for sub-Saharan Africa. During the workshop the participating NARS scientists evaluated the usefulness, contents and functionality of the training resource in a group work exercise. The main conclusions were that the training resource would be a valuable tool both in university teaching and in research; its contents could, to some extent, also be used in extension to farmers. The workshop participants found it easy to navigate within the training resource, although they felt there were details that could be improved. The availability of printer friendly versions of modules and case studies etc. was appreciated. Much of the content was considered highly relevant for African conditions, but more content could be included, e.g. additional case studies and examples and breed information on poultry, rabbits, pigs, fish, wildlife and endangered breeds.

Workshop participants emphasised that the Animal Genetics Training Resource would most likely contribute to more appropriate teaching and use of various teaching methods, and to more focused research and a better understanding of indigenous animal genetic resources. The importance of distributing the CD to many teachers/scientists involved in teaching and research in animal genetics and breeding in developing countries was also highlighted.

# Impact and experiences

The impacts reported here are primarily based on the replies to the impact assessment questionnaire and on reports and discussions in the sub-Saharan Africa follow-up workshop. Impacts of the computer-based training resource will be evaluated at a later stage, i.e. when teachers/researchers have had a chance to use it in their work. Impact assessments will be extended to activities in other regions as the project proceeds.

## Overall impact

The *impact assessment questionnaire* (Appendix 5) focused on impacts of the training course and was sent to the 38 previous participants of the courses given for sub-Saharan Africa. In total 26 replies were delivered. The participants were asked to grade impact on a scale from 1 to 9 (where 9 = very large impact), and to write comments on what was done, the results achieved and constraints encountered. The questionnaire covered impact of the training course in general, and more specifically on:

(i) teaching methods, course contents, curriculum review and courses

(ii) own research, research prioritisation and new initiatives, research supervision and communication of research

(iii) networking and

(iv) course materials.

There was also a question concerning dissemination of the experiences, knowledge and skills gained through the course to colleagues and others.

The results of the impact assessment questionnaires and discussions during the follow-up workshop showed that the African teachers/researchers felt that the ILRI–SLU capacity building project has quickly had a large impact on teaching and research in their home institutions. The question 'To what extent has the training course had a general impact on your work' got an average score 7.2 in the questionnaire. In the following sections the more specific impacts will be discussed.

## Impacts on teaching

A majority of the African course participants believed the training course has had a substantial impact on the teaching methods and the curriculum/course contents in animal breeding and genetics in their home institutions. Some questionnaire results are shown in Table 4.

**Table 4.** *Impacts of the training course on teaching methods and course contents in participants' home institutions (impact scored by the African participants; scale 1–9, where 9 = very much impact).*

| Teaching activity | Average score for impact |
|---|---|
| Teaching methods in general | 6.5 |
| Lectures | 6.8 |
| Student activating activities | 6.4 |
| Group discussions | 7.1 |
| Course contents | 6.6 |
| Curriculum review and new courses | 5.9 |

The attempts and changes in teaching methods included:

improved lectures, e.g. better structure and use of visuals, time for questions and discussion

introduction or increased use of group discussions (especially cross-group discussions), group work and project work

improved use of exercises, assignments, tutorials and field visits

introduction or improved use of Internet searches and computer laboratories (where available)

use of case studies, and also providing course notes or handouts to students (materials produced in the project have been useful here, but in some countries a French version would be needed)

Examples of changes in course content included:

more hours for animal breeding within course or curriculum. Replacement of old theoretical topics with topics from the training course

characterisation, management and sustainable use of animal genetic resources included in teaching, and more focus on indigenous animal genetic resources and indigenous knowledge. Breeding programmes and strategies, biodiversity and genetic evaluation added. Some universities have proposed/introduced new courses such as: 'Farm animal genetic resources', 'Animal breeding strategies' and 'Livestock farming systems'

molecular genetics and QTL added in course content (when teacher available)

science communication included in teaching.

At the University of Nairobi, for example, the experiences gained from the training course resulted in a complete review of the BSc and MSc curricula in Animal Science.

A number of the African scientists indicated that revision of course contents, improved lectures and increased use of student activating teaching methods etc., increased students' interest and commitment to animal breeding and genetics, and improved examination results. Students were stimulated to think and to discuss, and this resulted in faster and better understanding. Group discussions and group work helped break the 'ice' between the teacher and the students, and also encouraged teamwork among students.

Implementation of group activities was most successful when the class size was small. Large class sizes (sometimes up to >100 students) were often a constraint at BSc level, but do not occur in MSc programmes. The major constraint to teaching seemed to be changing the curriculum or sequence of courses and introducing new courses, because decisions have to be taken at several levels. Other constraints experienced in teaching included: time limitation in schedule, heavy work load of teachers, limited possibilities for using visual aids, lack of funding for field visits, and for computers and software, and unreliable and/or expensive Internet connections. It was encouraging, however, that so many of the teachers/researchers were motivated to make improvements in their teaching, despite the constraints. Hopefully, the improved results should influence future management of animal genetic resources in general and improvement of teaching facilities in particular in the long run.

# Impacts on research

The impacts of the training course on research were just as good as for teaching. This applies both to the African teachers'/researchers' own research and their supervision of students' research. Results from the questionnaires are shown in Table 5.

**Table 5.** *Impacts of the training course on research and research supervision in participants' home institutions (impact scored by the African participants; scale 1–9, where 9 = very much impact).*

| Research activity | Average score for impact |
|---|---|
| Own research | 7.1 |
| Research supervision | 6.8 |
| Research communication | 7.3 |
| Research administration | 5.3 |
| Prioritisation of research | 6.4 |

The main impacts of the training course on *research* in the African participants' home institutions can be summarised as:

More focus on research involving indigenous animal genetic resources. Examples of research areas now given more priority are: (i) Characterisation of indigenous breeds (e.g. chicken, pigs and small ruminants) and some wild animals; (ii) Animal genetic conservation, including genetic improvement; (iii) Evaluation of production systems in crossbreeding; and (iv) Smallholder livestock farming, including indigenous knowledge.

Research proposal writing improved—more competitive research proposals.

Research methodologies improved, i.e. design, data collection, data arrangement and statistical analysis. Enhanced literature review; extensive use of literature, databases and software presented in the training course.

Communication skills improved among the participants, i.e. scientific writing, oral presentation and poster presentation of research results. More papers submitted and more papers accepted for publication.

Supervision of students' research performed more efficiently and given more emphasis. Furthermore, training of students in literature search, scientific writing and oral presentation has been introduced, which has improved their skills.

Individual initiatives taken by participants to stimulate research, e.g. (i) Exchange of ideas between colleagues concerning research priorities, project planning and publication; (ii) Collaborative research projects; and (iii) National database on indigenous animal genetic resources initiated.

African participants identified several constraints to research in animal breeding and animal genetic resources in their home countries. Limited funding was the major constraint reported. Participants noted that research in this area often took too long and did not result in immediate profit. In addition, there was a lack of scientists with enough training in molecular genetics and in the statistical methodologies required in animal breeding research. The restricted opportunity for staff development and the often harsh research environments also made conducting research difficult. Participants also emphasised that there was not always an interest in the livestock industry to focus on indigenous breeds, because these did not fit the established technologies for abattoirs, milking machines, incubators etc. Furthermore, lack of breeding policies and awareness of the importance of animal genetic resources, and insufficient co-ordination between ministries and universities were other limitations.

A way forward would be improved awareness among stakeholders, and formulation of policies that give due recognition to indigenous animal genetic resources and indigenous knowledge. This should hopefully also give opportunities for improved national funding of such research. It was encouraging that several of the teachers/researchers after the training course increased their involvement in formulation of research strategies and breeding policies for animal genetic resources. Some of them also involved farmers in research prioritisation. Other ways forward that the participants could think of for strengthening research would be to strengthen partnerships and collaborative research, and to establish student and teacher/researcher exchange programmes, in addition to some joint MSc and PhD courses.

# Dissemination to colleagues

The ILRI–SLU training course can only reach a limited number of teachers/researchers in animal breeding and genetics. The participants were encouraged, therefore, to disseminate the knowledge, materials and skills gained through the course to colleagues in their own institutions and, if possible, to colleagues of other relevant institutions in their home countries.

Examples of dissemination carried out were:

seminars/workshops at home institute and research stations on the content of the course

department seminars on teaching methods, scientific writing and oral presentation

materials from the course (handouts, modules, CDs, literature, case studies, software, websites) made available at department and faculty

information to colleagues through e-mail

editing articles and project proposals and providing training in analysis of data

detailed course report written and distributed to the Department and to the Ministry of Agriculture.

Some participants also disseminated topics and experiences from the course to a wider audience through workshops, conferences and publications, and at stakeholder meetings on animal genetic resources. One participant taught extension workers to use group work.

The course participants indicated that their colleagues appreciated the dissemination efforts, and that this also led to increased communication between colleagues. Participants of the follow-up workshop promised to identify teachers and researchers within their respective countries that should get a copy of the Animal Genetics Training Resource. Distributing the CD to a wider audience than the course and workshop participants would definitely add to the impact of the training.

# Networking

Improved and new contacts among teachers/researchers in animal breeding and genetics were important impacts of the training courses and workshops held within the ILRI–SLU project. The contacts increased or improved both within and between countries in a region/sub-region, and also with ILRI and with SLU (Table 6). This was, of course, achieved during each course/workshop, but many contacts were also maintained after these activities.

**Table 6.** *Impacts of the training course on networking between each participant and colleagues in various institutions (impacts scored by African participants; scale 1–9, where 9 = very much impact).*

| Networking between the participant and | Average score for impact |
|---|---|
| Colleagues within home institution | 7 |
| Other universities and research institutes in home country | 5.5 |
| Livestock industry | 7.5 |
| Other course participants | 5 |
| ILRI | 5.5 |

A significant impact for networking was the creation of an *e-mail network in animal breeding* 'Afrib'. Participants of the first ILRI–SLU training course for Africa created this

network in early 2001, and any teacher/researcher interested in African animal genetic resources may subscribe to it.

To subscribe to Afrib: send an e-mail to *maiser@idpi1.agric.za, write nothing on the subject, and in the message simply write 'subscribe afrib'.* The network is administrated by one of the course participants, B. Nengovhela (South Africa) assisted by V. Yapi-Gnaore (Côte d'Ivoire). The need for networking was emphasised during the African follow-up workshop in November 2003. Discussions then focused on the establishment of an *Afrib website*, and on identifying 'all' teachers/researchers in animal breeding in Africa and including them in an *Afrib database*. The network will also push for a session or symposium on animal genetic resources to be included regularly at the AASAP (All Africa Society for Animal Production) meetings, which are held every four years. The Afrib network has been built and run on individual efforts without financial support. A big issue for Afrib will be to seek some financing, maybe through regional platforms, such as NEPAD. A similar network has not yet been formed in South-East Asia.

# Spin-off effects

In addition to the direct impacts of the project there were also important impacts or 'spin-off' effects. For example:

ILRI–SLU 'training the trainers' project was a new approach for capacity building in higher education in developing countries. The model used could be applied in other disciplines. Presentation of the project model and the CD generated interest at international meetings, e.g. WCGALP 2002 and AFANet Symposium at EAAP 2003.

The CD produced within the ILRI–SLU project served as a model for other CDs produced at ILRI, e.g. 'Smallholder Dairy Workshop', 'Small Ruminants' and 'Biometry'. There have been discussions on including the module 'Teaching Methods' (with minor revision) in some of the other CDs produced by ILRI.

The project strengthened the Swedish human capacity base for work on animal genetic resources in a variety of developing countries and contributed to a deepened understanding of conditions in higher education and research in those countries.

The project contributed to extended collaboration between a CGIAR institute (ILRI) and a university in the North (SLU). Joint SLU–ILRI training and supervision of two PhD students (1 Ethiopian and 1 Swedish) in animal breeding was started recently. There has also been joint supervision of two Swedish students conducting a minor field study in Ethiopia.

# Conclusion

The great needs of NARS scientists for training in the area of animal genetic resources and in research and teaching methodologies were clearly experienced during the first phase of the ILRI–SLU capacity building project for developing countries. Some main experiences and conclusions from this phase of the project are:

The *immediate impacts* of the training courses given for sub-Saharan Africa were substantial with regard to teaching and research in animal breeding and genetics in the home institutions of the course participants, as shown in the section 'Impacts and experiences'. The NARS scientists not only improved their awareness, knowledge and skills, they also become more enthusiastic and motivated to strive for improvements. As a consequence, an increased interest in animal genetic resources among students was observed. Enough time has not elapsed since the South-East Asia training course to analyse the impacts, but indications are that similar impacts as for Africa can be expected. The first version of the Animal Genetics Training Resource was released in October 2003, and it has not yet been possible to analyse its impacts.

The *long-term impacts* of the project cannot be evaluated at this stage, but expectations are that increased awareness, knowledge and skills on animal genetic resources will be multiplied through the large numbers of university students reached by the NARS scientists trained through the project. Their students are the future key players on animal genetic resources in developing countries. The planned wide coverage of the project in the regions and countries will further add to the impact, as will the spin-off effects.

All the project activities carried out in 1999–2003 were successful. Some experiences were:

- The *planning activities,* i.e. questionnaire, country visits and planning workshop, were crucial for establishing needs and for designing the training course and the computer-based training resources. The planning activities created contacts and captured local knowledge and gave country representatives ownership of the project, which resulted in increased willingness to support changes for improvement back home.
- The *training course* was fundamental to creating awareness among university teachers and researchers in developing countries about the needs and methods to improve higher education and research on FAnGR. The courses conducted so far were highly appreciated by the participants, both for the improved knowledge and skills achieved through the course, and for the exchange of experiences with colleagues within and across countries. The principle outline of the course (with modification by planning workshop participants) proved useful.
- The *computer-based Animal Genetics Training Resource* provides relevant materials and will reach a wider audience than the course, but simply sending out a CD or web

address will never be as efficient as combining this activity and the training course. Furthermore, the scientists attending the course will be important for spreading information within their countries about the training resource. Contributions by NARS scientists in providing case studies, breed information, maps, grey literature etc. were crucial for making the training resource relevant to different regions of developing countries. Great efforts are now needed to gather the same amount of information for Asia as has been done for Africa.

- The *network and contacts established* through the project activities were an important outcome. The initiative taken by the African course participants to form an e-mail network (Afrib) offers possibilities for sustained contacts among NARS scientists interested in farm animal genetic resources in Africa. A similar network for Asia would be desirable, preferably with links to Afrib.
- The *follow-up activities* (impact assessment questionnaires and follow-up workshops) were necessary to assess impacts, to give feed back to the project team, and to further stimulate contacts between NARS scientists in conducting joint research projects, curriculum development, teaching materials etc.

The 'training the trainers' approach adopted in the ILRI–SLU project appeared to be a good model for effective capacity building to promote sustainable use of animal genetic resources in developing countries. The approach was innovative and functioned well in the first phase of the project. Furthermore, linking universities of the North with those of the South, with a CGIAR institute playing both a facilitating and catalytic role was beneficial to all parties. There were, however, constraints that reduced the potential impact of this innovative approach. Lack or limited access to computers; unreliable and/or expensive Internet connections; large university class sizes at undergraduate level; few MSc students; heavy teaching loads, lack of facilities (e.g. presentation equipment and software); bureaucracy in changing curricula; language barriers (teaching materials provided through the project are currently only in English); limited research funding and lack of competence in molecular genetics were some of the constraints that needed to be overcome to reap the full benefits of the ILRI–SLU project.

# Future plans and way ahead

As concluded above, the first phase of the capacity building project was highly valued by participants and the immediate impacts in their home countries were substantial. Impact assessment at this stage of the project indicates that the 'training the trainers' was an efficient means of capacity building as regards initiatives for both improved university teaching and for research and research co-operation. Thus, the project enhanced ILRI research activities. The participatory approach, allowing NARS representatives to jointly with the project team develop the contents of the training course and the training resources, was crucial to the success of the project. The follow-up workshop also proved the value of establishing networks to be sustained after the courses. It also emphasised the need for physical meetings and discussions as well as electronic networks to stimulate further developments. Given the above experiences, plans are underway to proceed with expansion of the project activities to South Asia and implement follow-up activities in South-East Asia and sub-Saharan Africa, and to further develop the training resources.

# Activities planned

## Extension to South Asia

The project was extended to South Asia in 2004, as this part of the world has a large human population and the development of animal genetic resources was crucial in meeting future food demands as a means in alleviating poverty. The extension of the project will be co-ordinated with other ILRI projects in the region and by the needs expressed by FAO in connection with the implementation of the CBD. The proposal is to include India, Pakistan, Bangladesh, Nepal, Bhutan, Sri Lanka and probably Mongolia in the project. Later, steps will be taken to organise follow-up workshops for South-East Asia and South Asia, either individually or jointly.

## Further courses/workshops

The recently held follow-up workshop showed the need to consolidate future work in sub-Saharan Africa through another phase, and also to benefit from the emerging and planned research and development initiatives in this region, especially the NEPAD initiatives that establish and equip regional laboratory facilities. Specifically, advantage could be taken of the ongoing development of the East and Central African Biosciences Facility, housed at the ILRI campus in Nairobi, Kenya, and of similar facilities elsewhere. A closer association and professional relationship between Afrib and the All Africa Society for Animal Production (AASAP) was also envisaged, where Afrib, would in the

future co-ordinate separate and fully-fledged sessions where FAnGR related issues could be presented and discussed during scientific meetings organised by AASAP. The possibility of extending the project to developing countries in Latin America and the Caribbean needs further discussion, as this region was included in the original plan.

## Development of computer-based training resources

The computer-based Animal Genetics Training Resource will be further developed and improved in parallel with the other project activities. The new version will be produced on CD, and also on the web, which would make improvements and additions directly accessible for those connected to the Internet. In future versions of the training resource several technical features concerning frames and the build up of data, as well as the contents, will be improved gradually.

Case studies relevant to developing countries of different regions constitute an essential type of teaching material. During the coming year(s) case studies, breed information, maps etc. of relevance for Asia will be produced. The project in Asia is heavily dependent on contributions from Asian teachers/researchers and others involved in livestock development in this region. More case studies will also be needed for Africa.

The module texts will be revisited and further improved. The plan includes more exercises and examples, and probably a few compendia for use in teaching. Functionality of the library search will be improved, and more full text documents, plus some grey literature, will be included. The 'library' of web sites will be maintained and extended, but in future versions of the training resource direct links will be included to avoid link-failures arising from the usually frequent changes of web addresses which, given the large number of web links, would otherwise have to be constantly checked and updated.

Effort should be made to publicise the existence of the Animal Genetics Training Resource to encourage its use in developing countries and elsewhere.

## Further impact analyses needed

Further follow-up and impact analyses will be necessary after a few years to determine whether the training is still relevant and the experiences gained are still in use. Effects of networking and how these could be sustained should be further explored. It is envisaged that improved networking among the NARS and establishment of biosciences centres of excellence hosted by ILRI through the NEPAD regional initiatives will alleviate some of the constraints that are currently being experienced in institutions of research and higher education in developing countries.

An overview of the time schedule for project's accomplished and planned activities in the different regions is given in Table 7.

**Table 7.** *Time schedule for project activities in different regions (March 2004). Years for activities not yet performed are given in italics.*

| Region | Questionnaire to universities and research institutions | Country visits | Planning workshop | Training course | Impact question-naire | Follow-up work-shop(s) | Training resource CD version Later 1 2 versions |
|---|---|---|---|---|---|---|---|
| Africa | | | | | | | |
| East/south | 1999 (Inst,–replies) | 1999–2000 7 countries | 2000 16 participants from 13 countries | 2000 20 participants from 10 countries | 2003 to previous course participants | Nov 2003 20 participants *+ 2006?* | Oct 2003 *2005* Yearly *+Web +Web* |
| West/central | 2000 (Inst–, replies) | 2001 2 countries | Jointly with East/South Africa | 2001 18 participants from 10 countries | 2003 to previous course participants | Jointly with East/South Africa | Oct 2003 *2005* *Yearly* *+Web +Web* |
| Asia | | | | | | | |
| South-East | 2002 (24 inst, 12 replies) | 2002 4 countries | 2002 18 participants from 11 countries | 2003 18 participants from 9 countries | *2006* | *2006* | Oct 2003 *2005* *Yearly* *+Web +Web* |
| South | Apr 2004 | *Oct–Nov 2004* | *Oct–Nov 2004* | *2005* | *2007* | *2007* | *–2005* *Yearly* *+Web +Web* |

# Possible new developments

This project focused on capacity building for sustainable use of animal genetic resources in developing countries by training the trainers, using a CGIAR institute and a university in the North. This model could very well be applied for capacity building in other disciplines. It might be worthwhile to introduce the concept and experiences so far to other groups within ILRI, and in other CGIAR centres and ARIs.

The South-East Asian course showed the heterogeneity among countries in the region in level of competence in animal breeding and genetics, and in resources, English language skills etc. Establishing a two-stage capacity building programme to enable the more advanced countries within the region to assist in providing some pre-training courses would increase the opportunities for all participants of the region to fully benefit from the training programme.

Introducing training courses for younger scientists within each country, or in collaboration between a few countries, led by NARS scientists that have participated in our project could be yet another development. In that way the concepts of the project and

contents of the training resource would be effectively disseminated to many more scientists. A manual for such national courses should be worked out.

An electronic network, similar to Afrib, should be developed for Asia. One or two scientists from the Asia region, who have links with this project, will be encouraged to spearhead such an initiative. A further step could be to link the Asian and African networks.

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# Appendix 1. Contributors/participants

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|---|---|---|---|---|---|
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# Appendix 2. List of case studies: Version 1 of the Animal Genetics Training Resource (2003)

## Appendix 2a. Case studies produced specifically for the training resource

1. The unique Kuri cattle of the Lake Chad Basin by Ntombizakhe Mpofu and J.E.O Rege.
2. The multiplication of Africa's indigenous cattle breeds internationally: The story of the Tuli and Boran breeds by Ntombizakhe Mpofu.
3. The importance of breeding infrastructure and support services: The success and failure of artificial insemination as a method of disseminating genetic material to smallholder dairy farmers in southern Africa by Ntombizakhe Mpofu.
4. Choice of genetic types for specific production environments and production systems by Ntombizakhe Mpofu.
5. Crossbreeding systems and appropriate levels of exotic blood: Examples from Kilifi Plantations by A.K. Kahi.
6. Monitoring of Sahiwal and Friesian cattle genetic improvement programmes in Kenya by Ntombizakhe Mpofu and J.E.O. Rege.
7. Genetic improvement of indigenous cattle breeds in Zimbabwe: A case study of the Mashona Group Breeding Scheme by C.T. Khombe.
8. Comparison of indigenous and foreign cattle for beef production at Matopos Research Station in Zimbabwe by Ntombizakhe Mpofu.
9. Phenotypic and genetic parameters in cattle populations in Ghana by G.S. Aboagye.
10. Characterisation of genetic diversity in indigenous cattle of East Africa: Use of micro-satellite DNA techniques by M. Okomo-Adhiambo.
11. Genetic diversity in indigenous cattle for East Africa—using RAPDs by P. Gwakisa.
12. The importance of a national breeding policy—Case for the Malawian Dairy Industry by M.G.G. Chagunda.
13. Performance testing for the smallholder sector in South Africa by C.B. Banga.
14. The South African National Small Stock Improvement Scheme by J.J. Olivier.
15. The pig performance testing scheme in Zimbabwe by K. Dzama.
16. The development of breeding strategies for the large-scale commercial dairy sector in Zimbabwe by Ntombizakhe Mpofu.
17. Why value AnGR in economic terms? by A. Drucker.
18. How to value AnGR? by A. Drucker.

## Appendix 2b. Case studies from ICAR Technical Series 3 (1999)

1. The open nucleus breeding programme of Djallonké sheep in Côte d'Ivoire by V. Yapi-Gnaore.

2. Improving sub-tropical Egyptian fat-tailed sheep through crossbreeding with prolific Finnsheep by Abdul-Naga.
3. National rabbit project population of Ghana: A genetic case study by Lukefahr.
4. D'man sheep breeding programme in Morocco by Darfoui.
5. Peul, Touabire and Djallonke sheep breeding programmes in Senegal by Fall.
6. The N'Dama breeding programme at the International Trypanotolereance Center (ITC) in the Gambia by Dempfle and Jaitner.
7. Cross-breeding strategies for beef cattle production in Brazil by Euclides Filho.
8. An evaluation of the breeding strategies used in the development of the Dorper sheep and improved Boer goat of South Africa by Ramsay et al.
9. Buffalo breeding programme in Thailand by C. Chantalakhana.
10. Dairy cattle breeding programme in Brazil: Development of the Brazilian Milking hybrid by Madalena.
11. Development of animal breeding strategies for the local breeds of ruminants in French West Indies by Noves et al.
12. Structures for improving smallholder chicken production in Bangladesh: Breeding strategies by Jensen.
13. Sustainability of dairy cattle breeding systems utilizing artificial insemination in less developed countries—Examples of problems and prospects by J. Philipsson.

# Appendix 3. Questionnaire on postgraduate training in animal breeding/genetics in sub-Saharan Africa

## Part one

1. Name and contact details of University and responding Department:

   _____

   _____

   _____

   _____

   Fax: _____ E-mail:_____

   Tel.: _____

2. Name and position of respondent:

   _____

   Fax: _____ E-mail:_____

3. If your College/Department does not have a postgraduate programme with animal breeding/genetics components then mark ONE of the two below and return this page only.

   (a) No postgraduate training in Animal Science [ ]

   (b) Postgraduate training in Animal Science/Production offered but no animal breeding/genetics [ ]

4. Are you aware of a colleague in another Department and/or College (where animal breeding/genetics courses are taught at postgraduate level) who can contribute to this survey? If there is one, please send them a copy of this questionnaire. If you are not in a position to do so, please let us know so that we can send them one and please provide their name and address below.

   _____

   _____

   _____

   _____

   Fax: _____ E-mail:_____

## Part two

5. How many students, on average, are enrolled in the postgraduate programme in a given year? _____
6. How long does the MSc course normally take? _____ yrs.
7. What does the course involve? (Tick the right one)

   (a) Course work only

   (b) Course work and thesis research project

(c) Research (thesis) project only

(d) Other _____ (specify)

How long does each of the above components take?

(a) _____ (months)

(b) _____ (months)

(c) _____ (months)

(d) _____ (months)

8 List the animal breeding/genetics courses taken by students in postgraduate programmes in your Department.

| Courses | Hours for lectures | Hours for laboratory practicals | Hours for computing practicals | Total hours |
|---|---|---|---|---|
| Compulsory | | | | |
| a) | | | | |
| b) | | | | |
| c) | | | | |
| d) | | | | |
| e) | | | | |
| f) | | | | |
| g) | | | | |
| h) | | | | |
| i) | | | | |
| j) | | | | |
| k) | | | | |
| l) | | | | |
| m) | | | | |
| n) | | | | |
| o) | | | | |
| Optional | | | | |
| i) | | | | |
| ii) | | | | |
| iii) | | | | |
| iv) | | | | |
| v) | | | | |
| vi) | | | | |

Please use additional sheets if necessary

9. Other than lectures, laboratory and computing practicals, what other teaching methods, if any, do you use?

_____

_____

_____

10. Please now indicate, from the list of courses given in 6 above, which courses include topics on:
    A. Basic genetics
    B. Population genetics
    C. Breed characterisation methodologies (estimation of genetic parameters, between breed differences, estimation of genetic and phenotypic diversity, genotype–environment interactions etc.)
    D. Animal genetic improvement (principles of selection, breeding objectives, breeding programmes, cross breeding systems etc.)
    E. Methods of conservation of animal genetic resources

Please give your answer as the number of hours and/or percentage of each course devoted to each set of topics (A to E). A blank or no answer will be taken to mean that the particular set of topics is not yet covered in your courses.

| | Time (hrs/percentage) spent on | | | | |
|---|---|---|---|---|---|
| Course title (from answer 6) | A | B | C | D | E |

11. Do the courses (above) that include topics on conservation biology and animal genetic improvement also include the use of conserved or improved animal breeds?
    Yes/No
12. To what extent are laboratory and computing facilities adequate for the courses and students taught?

Laboratory

(a) Non-existent
(b) Not adequate (needs a lot of improvement)
(c) Moderate (needs small improvement)
(d) Adequate

Computing

(a) Non-existent
(b) Not adequate (needs a lot of improvement)
(c) Moderate (needs small improvement)
(d) Adequate

13. How many staff members are involved in teaching the postgraduate courses? By using disciplinary grouping (e.g. quantitative geneticists, molecular geneticists, reproductive physiologists, applied animal breeders etc.) please indicate (without giving names) the numbers of staff involved and their training levels (MSc, PhD etc.).

| Discipline | MSc | PhD | BVM | DVM | Other* | Total |
|---|---|---|---|---|---|---|

Example: Reproductive Physiologist: 1 MSc, 1 PhD—total of 2.
*Please specify here: _____

14. What teaching materials are available for animal breeding/genetics components of the postgraduate courses? [Answer by completing parts (a) to (f) below]
(a) List books used as course literature (*maximum 5*):

| Author | Year | Title | No. of copies in library | % of students who buy the books |
|---|---|---|---|---|
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | | | | |

(b) Are there any relevant journals available in the library (i.e. those received regularly)? Yes/No
If yes, please list the main ones (*maximum 5*):
1. _____
2. _____
3. _____
4. _____
5. _____

c) Are there any Asian (national and regional) datasets and/or databases used as course materials?

Yes/No

If yes, please list the main ones (*maximum* 3)

1. _____
2. _____
3. _____

(d) A case study is a written summary or synthesis of real-life experiences. They are therefore widely used to illustrate theories (i.e. bring theoretical concepts and practical situations together). Do you use Asian (national and regional) case studies when teaching?

Yes/No

If yes, please list the main documented case studies that you have used (*maximum 5*)

1. _____
2. _____
3. _____
4. _____
5. _____

(e) Are computer used in teaching?

Yes /No

If yes, please list the main ones (*maximum 5*):

1. _____
2. _____
3. _____
4. _____
5. _____

(f) Which computer programs are used for data analyses

1. _____
2. _____
3. _____
4. _____
5. _____

(g) How many computers are available for postgraduate students?

Total number: _____

Number of computers per postgraduate student: _____

15. Do postgraduate students have access to the Internet?

Yes/No

And do the computers they use have a CD drive?

Yes/No

16. What course teaching materials do you think are essential but not available for the postgraduate courses?

_____

_____

_____

_____

_____

_____

17. Specify the areas in animal breeding/genetics that you think need to be strengthened or introduced into the postgraduate courses (*maximum 5)*

1. _____
2. _____
3. _____
4. _____
5. _____

18. What, in your opinion, would limit (or does limit) adequate coverage or inclusion of the areas identified (in 14 above) in the present postgraduate courses?

_____

_____

_____

_____

19. To what extent have staff involved in teaching animal breeding/genetics in your institution (or Department) been trained in teaching methods?

(a) Not at all

(b) Small extent

(c) Large extent

20. Do you think a course (for faculty involved in postgraduate teaching) combining issues in animal breeding/genetic resources and teaching methods would help to improve your courses?

Yes/No

If the answer is yes, please list what aspects such a course could help improve.

_____

_____

_____

_____

21.

(a) From experiences elsewhere (Europe and North America), case studies have been found to be very valuable tools for teaching animal genetics and breeding, (i.e. they make the teaching more relevant to local conditions and improve under-

standing of complex topics). Do you agree with the need for case studies?
Yes/No

(b) If the answer to 21 (a) is yes, what areas/issues should case studies address?

_____

_____

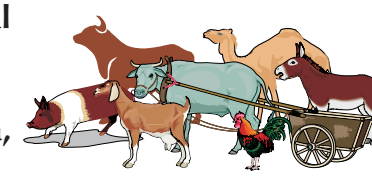
_____

_____

(c) Would you be interested in contributing to the development of case studies or helping identify potential case study authors?
Yes/No

# Appendix 4. Training course—Example of schedule

## Capacity building for sustainable use of animal genetic resources in developing countries ILRI–SLU–Sida training course for university teachers and researchers from South-East Asia, 7–25 January 2003, Bangkok, Thailand



| Date and time | Room | Facilitators | Topic (module references in italics within brackets) |
|---|---|---|---|
| Tuesday 7/1 | | | |
| 09.00–10.15 | L | KU, OM, BM, ER, LAE, JP | Welcome note, Kasetsart University |
| | | | Course introduction. Self introduction by participants |
| 10.15–11.00 | L | CC | Animal genetic resources in SEA—An overview |
| 11.00–11.30 | | | Coffee and photographs |
| 11.45–12.30 | L | JP, ER, HW | Animal genetic resources (AnGR) for sustainable agriculture (including FAO and ILRI activities within (AnGR) *(M1)* |
| 13.30–14.30 | L | PS | Brief presentation of Kasetsart University (KU) |
| | | | Drive around facilities |
| 14.30–16.00 | L | BM, JP | Teaching animal breeding—why, what, how? |
| | | | Teaching and research inter-relationships *(M5)* |
| 16.00–17.30 | L, C | OM, BM, LAE | *Demo/lab*: Training Resources on CD-ROM |
| | | | Introduction of case studies group work |
| 19:00 | | | Informal 'get together' and self-introduction |
| Wednesday 8/1 | | ER | Improving our knowledge of AnGR *(M2)* |
| 09.00–11.00 | L | | |
| 11.15–12.00 | L | JP, ER, OM | Introduction to project work 'Conservation programme for an indigenous breed' |
| 13.30–14.30 | L | JP | Components of a sustainable breeding programme *(M3)* |
| 15.00–17.00 | Lib. | NT | Library facilities at KU. *Literature search* |
| Thursday 9/1 | | | |
| 09.00–10.00 | L | JP | Defining breeding objectives. The role of identity and trait recording in livestock (M3) |
| 10.00–10.30 | L | VK | Experiences of dairy recording: The Thailand case |
| 11.00–12.00 | L, C | LAE, BM, OM | *Computer lab/demo:* LASER/Interherd software for livestock recording |
| 13.30–15.00 | L | BM | Oral presentation and visual displays *(M5)* |
| | | | Power Point demonstration |
| 15.30–17.30 | C | BM, LAE | *Computer lab:* Producing visuals in Power Point |
| Friday 10/1 | | | |
| 09.00–10.30 | L | BM, LAE | Aspects on teaching and learning (M5) (including buzz-group discussions) |
| 10.45–12.30 | L, C | BM, LAE, OM | *Computer lab (Databases):* FAO and World Bank statistics; DAD–IS; DAGRIS; LEAD; OMIA; Anubis etc. |

| Date and time | Room | Facilitators | Topic (module references in italics within brackets) |
|---|---|---|---|
| 14.00–16.30 | L | BM | Statistical analysis in animal breeding (M4 *partly*) how to make the topic understandable for students? |
| 19.00– | | | Social evening (theme: Thailand) |
| Saturday 11/1 | | | |
| Full day | | PS | Study visits |
| Sunday 12/1 | | | Free |
| Monday 13/1 | | | |
| 09.00–12.00 | L, G+ | BM, LAE | Teaching methods in animal science (M5) (including discussion on participant experiences) |
| 13.30–15.00 | L | ER, OM | Statistical analysis in animal breeding research and practice (M4) |
| 15.30–17.30 | L, C | ER, OM, AvD | *Computer demos and labs* (M4): Software for data analysis (SAS, AIREML/DFREML, MINITAB) |
| Tuesday 14/1 | | | |
| 09.00–12.00 | L | BM | Teaching genetic evaluation (M4 *and Compendium)* |
| 13.30–16.00 | L, C | BM, LAE | *Computer lab:* BLUP (using Excel) |
| 16.15–17.00 | L | CPs | Participants' experiences with genetic evaluation |
| Wednesday 15/1 | | | |
| 09.00–11.00 | L | OH | Basics and applications of molecular genetic markers in animal breeding |
| 11.15–12.00 | L | OM, BM, LAE | Mid-course review |
| 13.30–16.30 | L, C | ER, OM, LAE, BM, CPs | *Computer demos and labs (M4)*: Software for statistical analyses in quantitative genetics (AIREML/DFREML, VCE, etc). Including also some participant experiences. |
| 19.00–22.00 | L | BM, LAE | *Exercise:* Oral presentations (Group A) (Remaining groups: Time for project work) |
| Thursday 16/1 | | | |
| 09.00–12.00 | L, C | LAE | QTL, single genes and marker assisted selection in animal breeding programmes (M3 *and* M4). *Computer lab:* Analysis for QTL detection (M4) |
| 13.30–17.00 | L, C | OH | Measuring genetic diversity in populations (M2 *and 4*) Analysis of molecular data in breed characterisation (M4). (lecture and *computer lab*) |
| 19.00–22.00 | L | BM, LAE | *Exercise:* Oral presentations (Group B) (Remaining groups: Time for project work) |
| Friday 17/1 | | | |
| 09.00–12.00 | L, C | OH | Measuring genetic diversity in populations (M2 *and 4*) Analysis of molecular data in breed characterisation (M4) (lecture and *computer lab* continued) |
| 13.30–15.30 | L | ER, AvD | Planning, execution and analysis of breed surveys (M4) |
| 15.30–16.30 | L | JP, OM | Follow-up: Project work 'Conservation programme' |
| 19.00–22.00 | L | BM, LAE | *Exercise:* Oral presentations (Group C) |
| | | | (Remaining groups: Time for project work) |
| Saturday 18/1 | | | Free |
| Sunday 19/1 | | | Free |
| Monday 20/1 | | | |

| Date and time | Room | Facilitators | Topic (module references in italics within brackets) |
|---|---|---|---|
| 09.00–12.00 | L, G+ | BM, LAE | Methods for evaluating students and teaching *(M5)* |
| | | | How to stimulate educational/didactic development at a university? *(M5)* |
| 13.30–16.30 | L | JP | Sustainable breeding programmes for tropical farming systems *(M3)* |
| 16.30–18.30 | L, C | LAE, BM | *Computer lab:* Animal Breeding Tutorial |
| | | | Web searches for teaching materials, software etc. |
| Tuesday 21/1 | | | |
| 09.00–12.00 | L | DS, BB, CPs. | Examples of breeding programmes in SEA |
| 14.00–17.00 | L, C | JP, LAE, BM, OM | *Computer lab:* Breeding plans |
| 17:00 | | | Time for project work |
| Wednesday 22/1 | | | |
| 09.00–10.30 | L | ER, OM | Methods for conserving threatened breeds *(M3)* |
| 11.00–12.00 | G+ | OM, JP | Case studies: Group discussion |
| 14.00–15.00 | L | OM, JP | Case studies: Group reporting |
| 15.00–17.00 | L | BM, LAE | Scientific writing; Research supervision of Msc students; Essentials of a research proposal *(M5)* |
| 16.30 | | | Time for project work |
| Thursday 23/1 | | | |
| 09.00–12.00 | G+ | BM, JP, LAE, OM | *Cross-group discussion:* Breeding programmes and animal genetic resources conservation |
| 13.00–14.00 | L | BM | Poster presentation of research results *(M5)* |
| 14.00– | | | Time for project work |
| Friday 24/1 | | | |
| 09.00–12.30 | L | JP, ER, OM | Reporting and discussion of project work 'Conservation programme for an indigenous breed' |
| 14.00–15.00 | L | ER, OM, JP | Identification of research areas of priority in AnGR |
| 15.30–17.15 | G+, L | OM, BM | *Discussion:* Animal Genetics Training Resource |
| Saturday 25/1 | | | |
| 09.00–10.00 | L, G+ | BM, OM | *Group discussion:* |
| | | | – Desired improvements of animal breeding education in the participants' home countries (curriculum, course contents, teaching methods); Co-operation between universities/research institutes within the country; Prospects and how to reduce possible constraints |
| 10.30–12.00 | L | ER/JP + 'All' | Group reports and general discussion |
| 13.30–16.00 | L | 'All' | Course evaluation; Possible co-operation and networking between countries in teaching and research |
| | | | Discussion of future activities |
| 19:00 | | | Course dinner. Hand out of course certificates |

Teaching rooms:

L = Lecture room
C = Computer room
G + = Group rooms
Lib = Library

Facilitators:

ILRI (International Livestock Research Institute)

ER = Ed Rege
OM = Okeyo Mwai
OH = Olivier Hanotte
AvD = Anette van Dorland

SLU (Swedish University of Agricultural Sciences)

BM = Birgitta Malmfors
JP = Jan Philipsson
LAE = Lena Andersson-Eklund

Others

VK = Vanida Khumnirdpetch
HW = Hans Wagner
KU = Representative Kasetsart University
BB = Brian Burns
NT = Naiyana Treenatesumpun
PS = Pakapun Skunmun
DS = David Steane
CC = Charan Chantalakana
Cps = Course participants

Participants have been requested to contribute (lead discussions on the various topics or give their experiences in form of demonstrations during the last session of 13th, 14th and 15th January 2003 and first morning session on the 21st January 2003). Others who are willing to participate in similar capacities will be requested to indicate so during the first few days of the course.

# Appendix 5. Impact assessment questionnaire to the past course participants from eastern, southern, central and western African regions

Please fill the questionnaire on the computer by writing in the shaded fields and by ticking in shaded boxes

Save the file and name it Questionnaire 2003_nnn, where instead of 'nnn' you write the name by which you were addressed in the course (such as Girma, Guy etc.)

Name: Country:
Institution: Region:

Percent of your present working time spent on research, teaching, extension/consulting and other tasks at your home university/research institute (please select alternative by left-clicking the appropriate box):

| | 0–10% | 11–20% | 21–40% | 41–60% | 61–80% | 80–100% |
|---|---|---|---|---|---|---|
| Research | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Teaching | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Extension/consulting | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Other | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

The objectives of the ILRI–SLU training course were to support human capacity building by:

i) Increasing the awareness about issues regarding AnGR conservation and use

ii) Strengthening the knowledge and skills in the area of animal genetic resources, aiming at a better understanding of the needs and methods for sustainable use of livestock for food production in developing countries

iii) Making the participants acquainted with a variety of research and teaching methods, as well as materials of value and possible use for their own teaching, research and supervision in animal breeding and genetics

iv) Exchange of ideas and experiences between university teachers and researchers in animal breeding and genetics, and to stimulate networking

1. At the end of the ILRI–SLU training course 'Capacity building for sustainable use of animal genetic resources in developing countries', in which you participated in the year 2000 or 2001, you indicated that the course would have a positive impact on your work in teaching and/or research upon your return to your country institution. Reflecting back on the period between the course and now, indicate in the table below whether the course has had a general impact on your work, and to what extent.

| Attended the course in year | Has the course had any impact on your work? | General impact—to what extent? Very little 1 2 3 4 5 6 7 8 9 Very much |
|---|---|---|
| 2000 □ 2001 □ | Yes □ No □ | □ □ □ □ □ □ □ □ □ |

Any general comment?

2. Participants in the ILRI–SLU training course (2000 or 2001) indicated in the evaluation that the course would have an impact on their teaching in several ways, including the teaching methods. Indicate in the table below to what extent the experiences and skills gained during the training course have had an impact on teaching methods in your institution (or your country), and in what way.

   (Please tick boxes and write in the shaded fields. The space for your writing will expand where needed)

| 2 Teaching methods | Impact of training course? | Comments, e.g. What was done? Results on teaching and on students' learning? Constraints? |
|---|---|---|
| 2.1 In general | Very little 1 2 3 4 5 6 7 8 9 Very much<br>□ □ □ □ □ □ □ □ □ | |
| 2.2 Lectures | Very little 1 2 3 4 5 6 7 8 9 Very much<br>□ □ □ □ □ □ □ □ □ | |
| 2.3 Student activating activities — overall impact | Very little 1 2 3 4 5 6 7 8 9 Very much<br>□ □ □ □ □ □ □ □ □ | |
| What student activating activities? (fill below) | Very little 1 2 3 4 5 6 7 8 9 Very much | |
| 2.3.1 | □ □ □ □ □ □ □ □ □ | |
| 2.3.2 | □ □ □ □ □ □ □ □ □ | |
| 2.3.3 | □ □ □ □ □ □ □ □ □ | |
| 2.3.4 | □ □ □ □ □ □ □ □ □ | |
| 2.4 Other teaching activities? (fill below) | Very little 1 2 3 4 5 6 7 8 9 Very much | |
| 2.4.1 | □ □ □ □ □ □ □ □ □ | |
| 2.4.2 | □ □ □ □ □ □ □ □ □ | |
| 2.4.3 | □ □ □ □ □ □ □ □ □ | |

Further comments on impact/implementation of teaching methods?

3. Participants in the ILRI–SLU training course (2000 or 2001) also indicated in the evaluation that the course would have an impact on their course contents. Indicate in the table below to what extent the experiences and skills gained during the train-

ing course have had an impact on relevant course contents in your institution (or your country), and in what way.

| 3 Course contents | Impact of training course? | | | | | | | | | Comments, e.g. What was done? Results on teaching and on students' learning? Constraints? |
|---|---|---|---|---|---|---|---|---|---|---|
| 3.1 In general | Very little | | | | | | | | Very much | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| | □ | □ | □ | □ | □ | □ | □ | □ | □ | |
| 3.2 What contents? (fill below) | Very little | | | | | | | | Very much | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| 3.2.1 | □ | □ | □ | □ | □ | □ | □ | □ | □ | |
| 3.2.2 | □ | □ | □ | □ | □ | □ | □ | □ | □ | |
| 3.2.3 | □ | □ | □ | □ | □ | □ | □ | □ | □ | |
| 3.2.4 | □ | □ | □ | □ | □ | □ | □ | □ | □ | |
| 3.2.5 | □ | □ | □ | □ | □ | □ | □ | □ | □ | |
| 3.2.6 | □ | □ | □ | □ | □ | □ | □ | □ | □ | |

Further comments on impact/implementation of course contents?

4. Curriculum development is an important factor that influences the effectiveness of teaching and academic programmes in general. In order to remain relevant, curricula need to be reviewed from time to time. Participants in the ILRI–SLU training course (2000 or 2001) indicated in the evaluation that the course would have an impact on curricula and courses. Indicate in the table below to what extent the training course has contributed towards curriculum development in your institution (or your country), including the specific courses taught. What is the nature of the achievement or impact and how has this been achieved?

| 4 Curriculum/Courses | Impact of training course? | | | | | | | | | Achieved—What/How? (specify) |
|---|---|---|---|---|---|---|---|---|---|---|
| 4.1 Review of existing curriculum | Very little | | | | | | | | Very much | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| | □ | □ | □ | □ | □ | □ | □ | □ | □ | |
| 4.1.1 What's reviewed? (fill below) | Very little | | | | | | | | Very much | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| 4.1.1.1 | □ | □ | □ | □ | □ | □ | □ | □ | □ | |
| 4.1.1.2 | □ | □ | □ | □ | □ | □ | □ | □ | □ | |
| 4.1.1.3 | □ | □ | □ | □ | □ | □ | □ | □ | □ | |
| 4.1.1.4 | □ | □ | □ | □ | □ | □ | □ | □ | □ | |
| 4.1.1.5 | □ | □ | □ | □ | □ | □ | □ | □ | □ | |
| 4.2 Introduction of new courses (what courses?) | Very little | | | | | | | | Very much | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| 4.2.1 | □ | □ | □ | □ | □ | □ | □ | □ | □ | |
| 4.2.2 | □ | □ | □ | □ | □ | □ | □ | □ | □ | |

| 4 Curriculum/Courses | Impact of training course? | Achieved—What/How? (specify) |
|---|---|---|
| 4.2.3 | □ □ □ □ □ □ □ □ □ | |
| 4.2.4 | □ □ □ □ □ □ □ □ □ | |
| 4.2.5 | □ □ □ □ □ □ □ □ □ | |

Further comments on impact/implementation of curriculum development and new courses?

5. Participants indicated that part of their day-to-day responsibilities includes conducting research, supervision of research, administrative research support, and communicating research results. To what extent have the experiences and skills gained during the ILRI–SLU training course influenced the way you now carry out each of the above tasks or responsibilities and how?

| 5 Research activity | Impact of training course? | In what way (How)? |
|---|---|---|
| 5.1 Own research | Very little Very much<br>1 2 3 4 5 6 7 8 9<br>□ □ □ □ □ □ □ □ □ | |
| 5.2 Research supervision | Very little Very much<br>1 2 3 4 5 6 7 8 9<br>□ □ □ □ □ □ □ □ □ | |
| 5.3 Research administration | Very little Very much<br>1 2 3 4 5 6 7 8 9<br>□ □ □ □ □ □ □ □ □ | |
| 5.4 Communicating research | Very little Very much<br>1 2 3 4 5 6 7 8 9<br>□ □ □ □ □ □ □ □ □ | |
| 5.5 Prioritisation of research | Very little Very much<br>1 2 3 4 5 6 7 8 9<br>□ □ □ □ □ □ □ □ □ | |

Further comments on the implementation/impact of the training course on your research activities?

6. To what extent has the ILRI–SLU training course helped to catalyse your own research initiatives on the Animal Genetic Resources (AnGRs) that are of interest to you and are relevant to your country/region?

| 6 Initiative | Species and breed (specify) | Any results to-date or anticipated? |
|---|---|---|
| 6.1 New research initiated on indigenous AnGRs | | |
| 6.2 Increased budgetary allocation to indigenous AnGRs | | |
| 6.3 Collation of body of information on indigenous AnGRs | | |
| 6.4 Participation in the state of the world activities | | |

| 6 Initiative | Species and breed (specify) | Any results to-date or anticipated? |
|---|---|---|
| 6.5 New research, budgetary allocation or collation of information on any non-indigenous AnGRs (specify activity) | | |
| 6.5.1 | | |
| 6.5.2 | | |
| 6.5.3 | | |

Further comments on your own research on AnGR?

7. To what extent and how has the ILRI–SLU training course had an impact for increased networking between you and ILRI, and with the fellow training course participants and colleagues within your country and region?

| 7 Networking between you and | Impact of training course? | In what way (How)? |
|---|---|---|
| 7.1 ILRI | Very little Very much<br>1 2 3 4 5 6 7 8 9<br>□ □ □ □ □ □ □ □ □ | |
| 7.2 Other course participants | Very little Very much<br>1 2 3 4 5 6 7 8 9<br>□ □ □ □ □ □ □ □ □ | |
| 7.3 Colleagues within your institution | Very little Very much<br>1 2 3 4 5 6 7 8 9<br>□ □ □ □ □ □ □ □ □ | |
| 7.4 Other universities/research institutions in your country | Very little Very much<br>1 2 3 4 5 6 7 8 9<br>□ □ □ □ □ □ □ □ □ | |
| 7.5 Any other (specify): | | |
| 7.5.1 | Very little Very much<br>1 2 3 4 5 6 7 8 9<br>□ □ □ □ □ □ □ □ □ | |
| 7.5.2 | 1 2 3 4 5 6 7 8 9<br>□ □ □ □ □ □ □ □ □ | |

Suggest ways by which such networks could be enhanced:

| 7 Networking between you and | How to increase and improve the networking |
|---|---|
| 7.6 ILRI | |
| 7.7 Other course participants | |
| 7.8 Colleagues within your institution | |
| 7.9 Other universities/research institutions in your country | |
| 7.10 Any other (specify): | |
| 7.10.1 | |
| 7.10.2 | |

Further comments on networking?

8. At the end of the ILRI–SLU training course, you listed three things that you would definitely try to implement in teaching and/or research at your home institution. Visiting your own list (see point 4 in the attachment 'Course evaluation...'), state the extent to which you have achieved the intended or set target, and why you have or have not been able to do so?

| Target activity set by you (see attachment, point 4) | Extent to which it is implemented? | Reason(s) for success/ failure |
|---|---|---|
| 8.1 | Very little 1 2 3 4 5 6 7 8 9 Very much<br>□ □ □ □ □ □ □ □ □ | |
| 8.2 | Very little 1 2 3 4 5 6 7 8 9 Very much<br>□ □ □ □ □ □ □ □ □ | |
| 8.3 | Very little 1 2 3 4 5 6 7 8 9 Very much<br>□ □ □ □ □ □ □ □ □ | |
| Any related activity that you implemented? (specify) | | |
| 8.4 | Very little 1 2 3 4 5 6 7 8 9 Very much<br>□ □ □ □ □ □ □ □ □ | |
| 8.5 | Very little 1 2 3 4 5 6 7 8 9 Very much<br>□ □ □ □ □ □ □ □ □ | |
| 8.6 | Very little 1 2 3 4 5 6 7 8 9 Very much<br>□ □ □ □ □ □ □ □ □ | |

Further comments on implementation of target activities?

9. A lot of course materials were delivered during the ILRI–SLU training course. Please indicate below what you have mainly used of those materials in your teaching, research and supervision.

| Material (specify) | Purpose of use | How useful was the material? | Comments |
|---|---|---|---|
| | | Not useful 1 2 3 4 5 6 7 8 9 Very useful | |
| 9.1 | | □ □ □ □ □ □ □ □ □ | |
| 9.2 | | 1 2 3 4 5 6 7 8 9<br>□ □ □ □ □ □ □ □ □ | |
| 9.3 | | 1 2 3 4 5 6 7 8 9<br>□ □ □ □ □ □ □ □ □ | |

| Material (specify) | Purpose of use | How useful was the material? | | | | | | | | | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 9.4 | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| | | □ | □ | □ | □ | □ | □ | □ | □ | □ | |
| 9.5 | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| | | □ | □ | □ | □ | □ | □ | □ | □ | □ | |
| 9.6 | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| | | □ | □ | □ | □ | □ | □ | □ | □ | □ | |
| 9.7 | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| | | □ | □ | □ | □ | □ | □ | □ | □ | □ | |
| 9.8 | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| | | □ | □ | □ | □ | □ | □ | □ | □ | □ | |
| 9.9 | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| | | □ | □ | □ | □ | □ | □ | □ | □ | □ | |
| 9.10 | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| | | □ | □ | □ | □ | □ | □ | □ | □ | □ | |

Further comments on the course materials?

10. Unfortunately only a few teachers/researchers from each country could be invited to participate in the ILRI–SLU Training Course. It is therefore important that the experiences, knowledge and skills achieved during the course are disseminated to colleagues in the participants' home countries. Please indicate below to what extent you have been able to contribute with such dissemination.

| What was disseminated | How was it disseminated | Result |
|---|---|---|
| a. | | |
| b. | | |
| c. | | |
| d. | | |
| e. | | |
| f. | | |
| g. | | |
| h. | | |

Further comments on dissemination of the experiences, knowledge and skills achieved?

11. Anything else you would like to add concerning the impact of the ILRI–SLU training course that you participated in?

Thank you for filling the questionnaire!