

I L R I

International Livestock

I

Research Institute

**medium-term
plan**

2002–2004

**making the Livestock Revolution
work for the poor**

The vision, mission and mandate of ILRI

Vision

A world made better for poor people in developing countries by improving agricultural systems in which livestock are important.

Mission

To help reduce poverty, hunger and environmental degradation through livestock research to enhance productivity and sustainability of agricultural systems in the developing world.

Mandate

To measurably and sustainably improve the livelihood of resource-poor livestock keepers, make animal products more affordable and accessible for the poor and conserve natural resources in developing countries through partnerships and alliances for innovative livestock research, training and information exchange.

ILRI medium-term plan 2002–2004

making the Livestock Revolution

work for the poor

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02 May 2001

Dear Colleague,

ILRI's Medium-term Plan (2002–2004) sets out the priorities as outlined in *ILRI strategy to 2010: Making the Livestock Revolution work for the poor*.

What is the Livestock Revolution? Demand for meat and milk are projected to double in developing countries over the next twenty years. Meeting this demand will provide important opportunities for poverty reduction. Smallholders can build assets and generate income from their livestock. Moreover, starchy staple crops—coarse grains, roots and tubers—will provide income opportunities through marketing for livestock feed. There will also be major challenges to ensure that the urban poor obtain livestock protein and micronutrients at affordable prices and to mitigate the threat of environmental degradation from intensified livestock production. The CGIAR can help ensure that these opportunities and challenges are met through sustainable development-oriented livestock research.

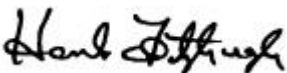
ILRI implements its new strategy within eight new programmes covering the key components of animal agriculture, and four cross-cutting holistic production-to-consumption systems projects that ensure delivery and impact from field-based research. ILRI works through partnerships with stakeholders, especially the smallholders themselves. To implement the programme, ILRI has recruited several key positions, including the Deputy Director General-Programmes and coordinators for new programmes.

In 2000, ILRI commissioned a major external review of its vaccine research. This resulted in defining new directions for this work, which are reflected in this MTP. East Coast fever vaccine research is being rapidly advanced through the application of genomics in collaboration with The Institute for Genomic Research. New programmes dealing with Livestock Feeds and Nutrition, and People Livestock and the Environment were created in 2000. These programmes were carefully conceived, planned and prioritised in 2000 and add important new dimensions to our work.

The future application of genomics or functional genomics is an area of increased emphasis for ILRI, dealing with many aspects of our work that cut across the project portfolio, in areas such as animal and forage genetics, rumen microbiology and health. ILRI will continue to advance research which links human, livestock and environmental health. There will be increased emphasis on decision support tools that exploit advances in, for example, GIS, spatial analysis and bioinformatics.

Building on extensive consultations with stakeholders, and anticipating priorities for change in the CGIAR, ILRI's MTP 2002–2004 presents an interdisciplinary systems approach to development-oriented research. ILRI will continue to leverage its resources through partnerships with NARS, ARIs and other centres. ILRI will outsource research and services to those alternative providers who have comparative advantage and, in turn, will draw on the skills of scientists seconded to the Institute. We will continue to emphasise strengthening livestock research capacity within our NARS partners.

We believe that ILRI is positioned to bring high quality science to serve the needs of the poor. With your support, we believe that we can translate this goal into reality. We welcome opportunities to discuss how ILRI's activities could better meet your investment priorities.



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International Livestock Research Institute

Medium-term Plan for 2002–2004

Overview

The World Bank¹ estimates 1.2 billion people, or nearly a third of the population of the developing world, continue to live on less than US\$ 1 a day—a fact described at the recent Davos World Economic Forum as the greatest single moral challenge facing human kind. Per capita incomes have been falling in sub-Saharan Africa for the past 25 years and over 70% of the population now live below the poverty line. Over two-thirds of the poor live in rural areas and rely on agriculture for a significant part of their livelihoods.² Despite the resolutions of the World Food Summit, over 650 million people—156 million of them children—are still expected to be food insecure by 2020, with up to 35% of the population in sub-Saharan Africa facing chronic malnutrition. The absolute numbers of poor people are highest in Asia (excluding West Asia), where an estimated 800 million poor now live.

Driven by rising incomes and population growth, the demand for meat and milk in developing countries is expected to double between now and the year 2020. The role of livestock in this next food revolution presents poor livestock producers with significant income-earning opportunities and possibilities to build assets and improve their livelihoods.

The strategy of the International Livestock Research Institute (ILRI) to 2010 is guided by the needs of the poor and hungry in the developing world—especially in sub-Saharan Africa and Asia—and the opportunities and

challenges presented by the anticipated doubled demand for livestock products. The medium-term plan for 2002 to 2004 sets out how ILRI will implement its strategy to help *make the livestock revolution work for the poor*. ILRI's priorities have been carefully determined through stakeholder consultations and *ex ante* impact assessments to enable the Institute to contribute most effectively to ensuring that the millions of resource-poor smallholders participate in the growing markets for livestock products. ILRI's research based technologies and interventions benefit the poor while protecting the natural resource base for future generations.

ILRI works with partners to implement its global agenda for international livestock research. The Institute's research, information and training activities add value to the greater investment made by national agricultural research institutions, leveraging additional resources from public and private research institutions.

As a global centre, ILRI contributes to development oriented livestock research in all developing regions. The major emphasis is in sub-Saharan Africa and Asia because of the number of poor people dependent on livestock, large numbers of food insecure people and the special needs for developing capacity for livestock research in these regions (Figure 1). Work in Central Asia and the Caucasus (CAC), West Asia and North Africa (WANA) and Latin America and the

1. World Bank. 2001. *World development report 2000/2001: Attacking poverty*. The World Bank, Washington, DC, USA.

2. IFAD (International Fund for Agricultural Development). 2001. *Rural poverty report 2001: The challenge of ending rural poverty*. IFAD, Rome, Italy.

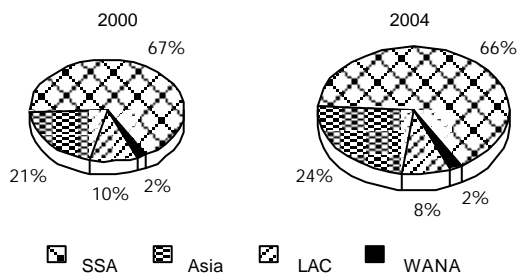


Figure 1. Regional relevance of ILRI research.

Caribbean (LAC) is implemented primarily through linkages with sister centres and their national partners in these regions. ILRI will continue to expend more than two-thirds of its resources in sub-Saharan Africa and is making a directed effort to expand the global relevance of the programme. By 2003, more than 70% of the programme in sub-Saharan Africa will have global relevance.

ILRI's primary beneficiaries are resource-poor livestock keepers in mixed crop-livestock systems with secondary emphasis on those in peri-urban and grassland systems and on the rural and urban poor who consume livestock products. ILRI's major focus will be on increased productivity in the mixed crop-livestock systems. Limited emphasis will be given to grassland and industrial livestock systems.

ILRI's primary emphasis will remain on ruminants, but with increased attention to swine and poultry, primarily through research in epidemiology, systems analysis and policy (Figure 2). Current estimates, based on the extensive strategic planning process conducted in 1999, indicate that of the 90% share directed to ruminants, half will support biological, systems and policy research relevant to both large (cattle and buffalo) and small (sheep and goats) ruminants; the other half will go to species-specific research on large ruminants (30%)

and small ruminants (15%). Over the medium term 15% of the research targeted to ruminants has generic relevance for monogastrics, including the more fundamental research in genomics and immunology, and the systems and policy research.

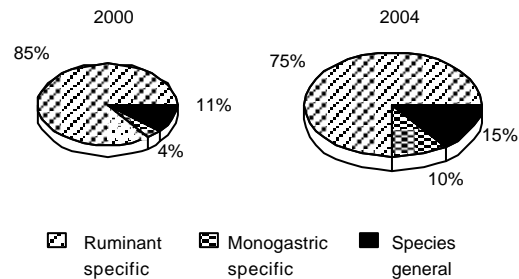


Figure 2. Relevance of ILRI research to ruminants, monogastrics and species general.

Summary of 2000 results and 2001 developments

Positioning ILRI to implement its strategy

The year 2000 was one of change at ILRI to position the Institute to implement the priority development-oriented research and related activities identified in the ILRI Strategy to 2010. Major changes during the year included a complete restructuring of programme and management, with the recruitment of a Deputy Director General-Programmes and new leadership for key programmes.

Inter-disciplinary participatory planning workshops were used to bring together ILRI staff and external experts to guide project development in the new directions identified in the strategy to 2010. The recommendations from the meetings held in 2000 will guide the research and related activities addressing:

- People, Livestock and the Environment

- Economic Valuation of Animal Genetic Resources
- Capacity building and training resources for Crop–Livestock Systems and Animal Genetic Resources
- Development of a virtual System-wide Livestock Programme (SLP) network

Following the major strategic planning and priority setting exercise, reviews and participatory approaches were used to guide programme development. An in-depth Centre Commissioned External Review (CCER) of vaccine research at ILRI resulted in significant changes in the priorities for livestock health research. Vaccine development plans have been designed with emphasis on the commercialisation of an improved vaccine against East Coast fever (ECF), the vector-borne haemoparasitic disease caused by *Theileria parva*. Research on development of a vaccine based on flagellar pocket antigens for trypanosomosis has been discontinued allowing resources to be reallocated to work on ECF. Future work focuses on moving the technologies from the laboratory to commercial production and distribution, assessing the potential demand for the improved vaccines and expected delivery pathways. Additional resources expected in 2001 for vaccine research together with the information on the *T. parva* genome sequence will accelerate progress.

Following the major changes in 2000, the year 2001 will be a time of consolidation of the agreed research and related agenda. In 2001, major reviews and participatory planning workshops will cover livestock feeds and nutrition activities and diagnostics for and genetic inheritance of trypano-tolerance within pure bred N'Dama cattle, as a contribution to the CCERs of the livestock feeds and nutrition and livestock genetic and genomics programmes planned for 2002. CCERs of programme and

management activities will be used as the basis for the next external programme and management review, scheduled for 2004. A comprehensive programme of CCERs is planned over the coming 3 years to allow new programmes the opportunity to develop their research plans before review in 2003/2004 (Box 1).

Box 1. CCERs scheduled for 2001–2002

- Joint TAC–ILRI CCER of the System-wide Livestock Programme (June 2001)
- Management and use of capacities in ILRI-Ethiopia (October/November 2001)
- Livestock feeds and nutrition activities (2002)
- Livestock genetic and genomics (2002)
- Capacity building activities—training and information (2002)

Programme highlights—2000

During 2000, significant progress was made towards developing options and strategies by which smallholder farmers can improve the sustainability and productivity of their crop–livestock systems, with the farmers, their families and their communities benefiting through reduced poverty, hunger and environmental degradation.

ILRI together with the International Food Policy Research Institute (IFPRI) and the Food and Agriculture Organization of the United Nations (FAO) made a major contribution to understanding the positive role of livestock in poverty alleviation in 1999 in their study *Livestock to 2020: The next food revolution*. In 2000 this study was widely used to set priorities for livestock research, development assistance and investment decisions.

The year 2000 has seen the completion of the sequence of the human genome. In collaboration with The Institute for Genomic Research (TIGR), ILRI's contribution to the genomic era will be the publication of the complete sequence of *T. parva* in July 2001. This will provide a rational basis for selection of candidate antigens for the development of a multi-component vaccine for ECF.

At ILRI genomics research also contributes to understanding the genetic basis of tolerance of or resistance to two important livestock diseases—trypanosomosis and helminthosis. Smallholders will apply results of this work to selected breeding of more productive and tolerant livestock. Advances in 2000 included:

- Eight potential loci for trypanotolerance were identified in an N'Dama×Boran second generation crossing population
- Genes controlling resistance to intestinal helminths were mapped in a mouse model
- DNA analysis from African cattle breeds indicates a separate centre of domestication for African taurine breeds in the north Sahara.

Livestock and human health are closely linked, particularly in developing countries where the majority of livestock keepers are rural poor and disease control is limited. During 2000 ILRI research documented:

- The incidence of sleeping sickness in sub-Saharan Africa is reduced by control of livestock trypanosomosis
- Public health policies and interventions are necessary to control tuberculosis, brucellosis and other zoonoses which may be carried by the milk marketed through traditional (non-regulated) channels in developing countries
- Genome sequencing of pathogens and host resistance traits means that ILRI's

research on livestock disease directly benefits from and contributes to research on human diseases.

Adoption and intensification of market-oriented dairy production by smallholders is a key innovation that benefits the livelihoods of the rural and peri-urban poor through improvements to their incomes, their asset base and their nutritional security. In 2000 ILRI's interdisciplinary and inter-institutional work in this area documented:

- The informal (non-regulated) markets that dominate milk marketing in most developing countries, provide up to 10 times more employment opportunities than the formal sector in eastern Africa
- Entry by smallholders into milk markets in Kenya was promoted by improved infrastructure, farmers' knowledge and asset accumulation
- Negative effects on milk prices resulting from poor road infrastructure affecting market access by smallholders were quantified
- Milk production increases of up to 30% resulting from work with Centro Internacional de Agricultura Tropical (CIAT) on the introduction of the legume *Arachis pintoi* as a component of grazing systems
- Reductions, approaching 20%, in feed costs without reduced milk yields obtained through work with CIAT on introduction of the fodder tree *Cratylia argentea* in cut-and-carry systems.

Low quality of feeds and fluctuating supplies are the major factors limiting the productivity of livestock in smallholder systems. ILRI reorganised its feeds and nutrition activities in 2000 to focus its research on mitigating the effects of inadequate nutrition in tropical ruminants. This includes work on identifying adapted

forages, improving feed quality of crop residues and improving the utilisation of feeds by the animal. In 2000 ILRI:

- Developed, in collaboration with the International Institute of Tropical Agriculture (IITA), new varieties of cowpea that produce more grain and more high quality fodder
- Identified in collaboration with the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) one candidate quantitative trait loci (QTL) associated with feed quality of pearl millet stover
- Established collaboration with TIGR for molecular characterisation of bacteria isolated from livestock and wild herbivores and involved in feed digestion
- Identified a core set of 47 accessions of the promising forage legume *Lablab* that contains most of the variation from the major world collections for further evaluation and use.

Natural pasture and crop residues remain the major feed resource for livestock, especially in sub-Saharan Africa, where interactions between people, livestock and their environment are being studied and options developed for sustainable use of natural resources at the ecosystem level. Results in 2000 demonstrated:

- Livestock and pastoral land use attracts wildlife in East African landscapes, creating more diverse landscapes than those without people
- Pastoralists are willing to conserve wildlife once their basic needs are met
- The SAVANNA model improves selection of land use options for people and livestock interactions in agropastoral households.

Enabling policies are essential to promote sustainable natural resource management, adoption of innovations, market access and

trade. ILRI studies the impact of government policies affecting the livestock sector and develops policy, institutional and management options and strategies for policy makers, policy researchers and analysts in developing countries. Studies in 2000 demonstrated:

- Economic returns to alternative land use options show that households are earning considerably more from livestock than from crops in East Africa
- Supply of livestock products in China will be insufficient to meet the expected growth in demand, leading to substantial increases in imports and providing market opportunities for smallholders in the region
- Lack of appropriate conservation technologies or their inadequate diffusion were major reasons for resource degradation in Ethiopia.

Innovations, technologies and decision support tools were transferred for use by national programmes and smallholder farmers including:

- PCR–ELISA and DNA-based tests to detect and differentiate three livestock species of trypanosomes
- Molecular probes and PCR-based markers for *T. parva*
- Decision support tools for improved foot-and-mouth disease control
- A bio-economic model to assess *ex ante* technology and policy impact on human welfare and the environment at watershed level.

In 2000 ILRI focused attention to building livestock research capacity in collaboration with the consolidated capacity building programme for sub-Saharan Africa because of the special needs of the region. Products to build capacity in national agricultural research systems (NARS) in 2000 were:

- Teaching modules for livestock genetic

resource characterisation, conservation and utilisation

- ILRI's searchable full-text virtual library, containing over 90% of the technical publications from ILRI and the former International Livestock Centre for Africa (ILCA) and the International Laboratory for Research on Animal Diseases (ILRAD) over the last 25 years.

Intellectual property

Intellectual property (IP) related to international conventions and access to genetic resources, information and technologies has become a major issue in partnerships, especially in alliances with the private sector. In 2000 ILRI:

- Established an Intellectual Property Management Unit (IPMU)
- Recruited an IP Officer and established working links with the Central Advisory Service (CAS)
- Completed the IP audit and revised the Institute's IP policy
- Reviewed all existing agreements and material transfer agreements with respect to IP.

In 2001 ILRI will strengthen the IPMU with additional staff and develop IP capacity at ILRI through training in collaboration with the International Service for the Acquisition of Agri-Biotech Applications (ISAAA).

Bioethics and biosafety

As an international organisation, ILRI pays particular attention to bioethics. ILRI works to attain equity in the use and sharing of the benefits derived from its research. ILRI abides by international conventions, such as the Convention on Biological Diversity, and recognises the contribution of many different communities and individuals, especially of women and traditional societies, to the conservation and enhancement of genetic diversity of potential use for food and

agriculture. The Institute strives to ensure that the benefits derived from such use are made available to those that developed and nurtured these resources.

ILRI pays attention to the welfare of livestock and laboratory animals used in its research. The Institute adheres to the most stringent operating procedures for experimental animals based on the British Animals (Scientific Procedures) Act of 1986. This policy is strictly enforced and all experiments using animals must pass review and approval by the Institute Animal Care and Use Committee.

ILRI follows national biosafety regulations for movement of germplasm or biological materials and for containment of disease organisms used in its research projects. The Institute established a biological containment facility to support its work on vaccine development. ILRI ensures to the extent possible that the products of its research will not have negative environmental consequences, negative impact on human or animal health nor negative impact on biological diversity through:

- Full experimentation and testing on station in secure contained conditions before release for field testing
- *Ex ante* assessment of the impact of new technologies on the environment and biodiversity before release for use
- Risk assessment of those products or biological material which have been genetically modified.

Highlights of changes for 2002

ILRI implements its programme through eight projects. Milestones and outputs are indicated for each in Annex I. Assessment of progress against agreed priorities in relation to changes in the external environment will

be an ongoing component of programme management. Logical frameworks are used for project planning and monitoring and external peer review is important to assess scientific quality of research. Changes in direction and activities within the agreed agenda will result from these assessments. ILRI uses a priority assessment framework to guide decision-making and resource allocation. This framework is based on five primary criteria by which priorities are assessed. These reflect the vision, mission and mandate of ILRI and the priorities and strategies of the Consultative Group on International Agricultural Research (CGIAR):

- Contribution to poverty reduction
- Expected economic impact within an economic surplus framework
- Environmental impact
- Internationality of the problem
- Contribution to capacity building, development of new research tools, and improved research efficiency.

Current information on the extent and distribution of poverty within the target regions and livestock systems is essential for priority assessment. Poverty mapping will be a major activity in 2001. By 2002 the priority assessment framework will be a useful tool for ILRI and NARS, not only to assist in priority setting and research planning but to better understand the factors that drive poverty alleviation and ensure the products of ILRI programme benefit the rural poor.

Changes in activities from those envisaged in the medium-term plan for 2001–2003 have been identified for the Livestock Health and People, Livestock and the Environment research areas as indicated below. Following the recommendations of the CCER and building on the new information available from the genome

sequence of *T. parva*, ILRI will redirect and concentrate its vaccine research on ECF:

- Research on the flagellar pocket antigen for disease control of trypanosomosis has been brought to a close
- Research on the congopain vaccine will continue with CIRAD–EMVT
- ILRI's primary efforts on trypanosomosis will focus on epidemiology and design of more effective control programmes and on genetics of trypanotolerance.

The People, Livestock and the Environment research area was the focus of a major participatory planning and priority setting exercise during 2000. New work in that area will cover:

- Impacts of climate change on poor pastoralists and farmers linked to the System-wide Initiative on Climate Change
- Synthesis of pastoral risk management in pastoral ecosystems
- Integrated natural resources management and ecosystem approaches to understanding and improving the sustainability of livestock based systems
- Impacts of livestock and land-use change on biodiversity, linking genomics and ecosystem science.

Recommendations from the CCERs on the SLP and management and use of facilities in ILRI-Ethiopia will likely result in changes in activity. These will be implemented in 2002.

Major features of the 2003–2004 project portfolio

By 2003 commitments to ongoing work will be coming to a close and changes identified in the Strategy to 2010 will have been

implemented. Major features include:

- Determining the impact of ILRI innovations with *ex post* impact studies of production and market interventions for smallholder dairy at benchmark sites
- Crop–livestock, ecosystem and land-use models developed and applied trans-regionally, to explore system changes and evolution within an ecoregional context for priority setting and impact assessment
- Livestock feed innovations for key agro-ecological zones and production systems identified and participatory rural approaches used for their identification, evaluation and promotion
- Selected food crops with improved feed quality identified
- Policy options and strategies developed to reduce resource degradation and promote intensification, technology adoption, marketing and regional trade in livestock and livestock products
- Policy options that will enable smallholders to increase their participation in market-oriented livestock production in Asia, Africa and LAC
- Decision support models and databases available for improving human welfare, conserving natural resources and devel-

oping successful natural resource management strategies

- Improved information technologies that promote partners participation in virtual laboratories and use of information systems and training resources.

Changes in milestones

Project milestones and logical frameworks for projects are detailed in Annex I.

Collaboration highlights

ILRI will continue to work through collaborative arrangements, providing expertise in livestock and livestock-related research to consortia, alliances and partnerships. Partnerships with national research systems will continue to be strengthened and new emphasis will be placed on developing strategic alliances with non-traditional partners including non-governmental organisations for extension and technology transfer and the private sector for delivery of products (Table 1). ILRI is expanding collaboration with external partners who are eligible for funding from national science funding agencies to encourage and assist them obtain funding and undertake research relevant to the Institute’s mandate.

Table 1. *Non-traditional partnerships.*

Private sector	Non-governmental organisations
AGIP	African Conservation Centre
Brentec Laboratories, Kenya	African Wildlife Foundation
Chiron, USA	Sasakawa-Global 2000
Compagnie J. Van Lancker, RD Congo	World Wide Fund for Nature
Coopers, Kenya	
Intervet, The Netherlands	
Pecura-Quiagen, Germany	
Seppic, France	
The Institute for Genomic Research, USA	

ILRI will continue to participate in system-wide and ecoregional programmes and provide the leadership to the System-wide Livestock Programme (Box 2). The Institute continues to host CGIAR and other international organisations in Ethiopia and Kenya to make best use of existing facilities and infrastructure. ILRI currently has joint appointments with CIAT, CIP, CIRAD-EMVT, ICRAF, IITA and CTVM.

Box 2. Participation in CGIAR system initiatives.

- African Highlands Initiative led by ICRAF
- CONDESAN in the Andes led by CIP
- Desert Margins Programme led by ICRISAT
- Ecoregional Programme for the Humid and Subhumid Tropics of SSA led by IITA
- IARC/NARS Training Group in SSA
- Inter-centre Working Group on Climate Change
- Participatory Research and Gender Analysis Programme led by CIAT
- Subregional consortia in the CAC-WANA region led by ICARDA
- System-wide Initiative on HIV/AIDS led by CDC-SSA
- System-wide Livestock Programme led by ILRI
- System-wide Genetic Resources Programme led by IPGRI
- System-wide Programme on Collective Action and Property Rights led by IFPRI
- Tropileche consortium in Central and South America led by CIAT

Centre staffing highlights

The most important element for implementing the ILRI strategic plan is the identification and recruitment of priority positions. In 2000 ILRI developed the concept of **key** and **essential** positions to prioritise positions. Key positions are those with responsibility for scientific leadership and institutional management. Essential positions are essential to implement ongoing project and administrative operations.

ILRI identified approximately 70 key international staff positions. The target is to move forward filling these positions in the medium term. In addition to these key and essential positions ILRI expects additional staffing through postdoctoral positions, attachments, special project positions, secondments, joint appointments and other arrangements.

Based on the identification of key and essential positions ILRI examined its current complement and made 6.5 internationally recruited staff (IRS) positions redundant and reclassified 6 other positions from IRS to nationally recruited staff (NRS). All of these changes have been accounted for in the 2001 operating budget.

In 2000, the Institute also made a number of changes at the NRS level. Services such as grounds maintenance and banking were outsourced in Kenya and the Finance department was reorganised and staffing rationalised with introduction of new computer software. Staff numbers in the farm operation in Nairobi were reduced reflecting a decrease in demand for experimental animals. The total reduction in NRS as a result of these measures was 34 positions.

These actions in 2000 have been taken to reposition ILRI to more effectively address the challenges as outlined in the strategic plan.

In 2001, ILRI has identified 28 new or replacement positions. These positions have been prioritised based upon the key and essential positions defined in 2000 and the positions have been approved in the ILRI 2001 operating budget. In 2001, personnel costs accounted for approximately half of the ILRI budget. Currently approximately 13% of ILRI's staff are internationally recruited.

In 2002 and beyond, ILRI expects to:

- Significantly increase the number of postdoctoral and associate scientists
- Continue to explore ways of outsourcing service operations
- Rationalise positions with other CGIAR centres where circumstances warrant.

Project cost components

Unrestricted funding continues to decline in absolute and especially relative terms, reducing the flexibility of ILRI to respond to new challenges and opportunities, although the overall support for livestock research is increasing through project and programme restricted funding. Increases in matching funds by the World Bank will have a positive effect in increasing flexibility.

ILRI allocates its resources to the agreed priorities in the strategy. In addition, ILRI is leveraging funds through partnerships which increases the overall resources available for priority research including:

- Matching funds from TIGR for sequencing the *T. parva* genome
- Access to bilateral funds from development agencies for dissemination and delivery of ILRI products
- Participation in the Global Livestock CRSP project
- Participation in global consortia for climate change modelling.

Significant new and additional funding is expected in 2001 and 2002 to support:

- Development of a vaccine for ECF
- Poverty mapping to support priority setting and project development
- Participatory research on improving assets and sustainability of rural livelihoods through improved livestock feed and soil management
- Land-use change impacts and dynamics in livestock systems of East Africa
- Environmental impacts of farming after tsetse control in East Africa
- Wildlife–livestock integration in Africa.

ILRI is seeking new and additional funding from:

- Non-traditional donors
- Participation in the Future Harvest Global Conservation Trust Initiative and the Funding Plan to Upgrade CGIAR Genebanks.

Centre financial health indicators

The funding environment remains uncertain. Over the medium term ILRI anticipates a modest increase in total funding. For 2004, US\$ 33.6 million total revenue is projected, comprising US\$ 12.0 million from unrestricted funding and centre income and US\$ 21.6 million from targeted funding, of which two-thirds will be from special project restricted funding. In spite of the funding uncertainty, ILRI aims to balance its expenditure against revenues throughout the planning period. However, ILRI may draw on reserves to bridge gaps in project funding to ensure continuity of long-term research, while maintaining the minimal long-term stability ratio for 120 days. The current operating reserve stands at US\$ 3.8 million and capital

reserve at US\$ 5.9 million. The current ratio (current assets divided by current liabilities) is 2.4:1. The long-term stability ratio (operating plus capital reserves divided by revenue and multiplied by 365) is 142 days. This compares favourably with the CGIAR target of 90–120 days.

Financing plan

The TAC recommended level of investment in ILRI is 9.3% of the total CGIAR funding. This translates to US\$ 33.0 million for 2002 at the total projected funding for CGIAR of US\$ 355 million. However, based on current projections, ILRI's funding for 2002, will be US\$ 31.6 million. The

Institute's funding target is US\$ 37 million for 2005, comprising 35% unrestricted funding, 25% programme restricted and 40% project restricted funding. ILRI will give special emphasis to fund raising in 2001–2002 to reach its target of 9.3% by 2005. In addition, ILRI is reducing the proportional cost of administrative support through cost-effective planning, contracting out services and cost sharing with ICRAF and other centres in common locations. These measures allow ILRI to allocate 83% of its resources to programme in 2001 to directly support the priority programme activities to help make the Livestock Revolution work for the poor.

Financial Tables

Table 1. ILRI—Research Agenda Requirements, by Output,^{1/} 2002

(expenditure in US\$ million)

Centre projects	Germplasm Improvement	Germplasm Collection	Sustainable Production	Policy	Enhancing NARS	Project Totals
Project 1 Systems analysis and impact assessment			3.3		0.1	3.4
Project 2 Livestock feeds and nutrition	0.9	0.7	1.6		0.1	3.3
Project 3 Livestock health						
Biotechnologies for disease control			5.4		0.2	5.6
Integrated disease control			2.9	0.3	0.2	3.4
Project 4 Livestock genetics and genomics	1.7	1.4	0.8		0.2	4.1
Project 5 People, livestock and the environment			3.9	0.5	0.2	4.6
Project 6 Livestock policy analysis				2.1	0.1	2.2
Project 7 Strengthening partnerships for livestock research					3.0	3.0
Project 8 System-wide livestock programme	0.5		1.0	0.2	0.3	2.0
Undertaking totals	3.1	2.1	18.9	3.1	4.4	31.6

^{1/} Please refer to Table 2 for the crosswalk between the CGIAR Activities and the new CGIAR Outputs.

Table 2. ILRI Research Agenda—Allocation of Resources, 2000–2004
(expenditure in US\$ million)

**Allocation of Resources by Outputs
Logical Framework Format**

Outputs:

Germplasm Improvement

(Activity: Germplasm Enhancement & Breeding, plus Networks, as appropriate)

Germplasm Collection

(Activity: Saving Biodiversity, plus Networks, as appropriate)

Sustainable Production

(Activity: Production Systems Dev & Mgmt, Protecting the Environment plus Networks, as appropriate)

Policy

(Activity: Improving Policies plus Networks, as appropriate)

Enhancing NARS

(Activity: Strengthening NARS - the three sub-activities, plus Networks, as appropriate)

TOTAL

	2000 (actual)	2001 (estimate)	2002 (proposal)	2003 (plan)	2004 (plan)
Germplasm Improvement	1.9	2.6	3.1	3.2	3.4
Germplasm Collection	1.4	2.0	2.1	2.3	2.3
Sustainable Production	17.2	18.0	18.9	19.1	19.7
Policy	2.6	2.9	3.1	3.3	3.4
Enhancing NARS	4.0	4.2	4.4	4.7	4.8
TOTAL	27.1	29.7	31.6	32.6	33.6

Allocation of Resources by CGIAR Activity

Increasing Productivity

of which:

Germplasm Enhancement & Breeding

Production Systems Development & Management

Protecting the Environment

Saving Biodiversity

Improving Policies

Strengthening NARS

of which:

Training and Professional Development

Documentation / Information

Organisation & Management

Networks

TOTAL

	2000 (actual)	2001 (estimate)	2002 (proposal)	2003 (plan)	2004 (plan)
Increasing Productivity	16.1	16.8	18.1	18.4	19.1
of which:					
Germplasm Enhancement & Breeding	1.9	2.6	3.1	3.2	3.4
Production Systems Development & Management	14.2	14.2	15.0	15.2	15.7
Protecting the Environment	3.0	3.8	3.9	3.9	4.0
Saving Biodiversity	1.4	2.0	2.1	2.3	2.3
Improving Policies	2.6	2.9	3.1	3.3	3.4
Strengthening NARS	4.0	4.2	4.4	4.7	4.8
of which:					
Training and Professional Development	1.6	1.7	1.8	1.9	2.0
Documentation / Information	1.3	1.4	1.4	1.5	1.5
Organisation & Management					
Networks	1.1	1.1	1.2	1.3	1.3
TOTAL	27.1	29.7	31.6	32.6	33.6

Table 3. ILRI Research Agenda Project and Output Cost Summary, 2000–2004

(in US\$ million)

	2000 (actual)	2001 (est)	2002 (proposal)	2003 (plan)	2004 (plan)
Project 1 Systems analysis and impact assessment	3.2	3.4	3.4	3.5	3.6
Project 2 Livestock feeds and nutrition	2.8	3.0	3.3	3.6	4.0
Project 3 Livestock health					
Biotechnologies for disease control	5.8	5.6	5.6	5.6	5.7
Integrated disease control	3.1	3.4	3.4	3.6	3.6
Project 4 Livestock genetics and genomics	2.4	4.1	4.1	4.3	4.4
Project 5 People, livestock and the environment	3.6	4.5	4.6	4.6	4.7
Project 6 Livestock policy analysis	1.8	2.1	2.2	2.3	2.4
Project 7 Strengthening partnerships for livestock research	3.0	3.0	3.0	3.1	3.2
Project 8 System-wide livestock programme	1.4	0.6	2.0	2.0	2.0
Total	27.1	29.7	31.6	32.6	33.6

Summary by Undertaking:

	2000 (actual)	2001 (est)	2002 (proposal)	2003 (plan)	2004 (plan)
Germplasm Improvement	1.9	2.6	3.1	3.2	3.4
Germplasm Collection	1.4	2.0	2.1	2.3	2.3
Sustainable Production	17.2	18.0	18.9	19.1	19.7
Policy	2.6	2.9	3.1	3.3	3.4
Enhancing NARS	4.0	4.2	4.4	4.7	4.8
Total	27.1	29.7	31.6	32.6	33.6

Institutional Cost Components:

	2000 (actual)	2001 (est)	2002 (proposal)	2003 (plan)	2004 (plan)
Direct Project Costs	22.2	24.3	26.0	26.8	27.6
Indirect Project Costs (Overhead)	4.9	5.4	5.6	5.8	6.0
Total Project Costs	27.1	29.7	31.6	32.6	33.6

Table 4. ILRI Allocation of Project Costs to CGIAR Outputs, 2000–2004

(in US\$ million)

Project	Activity	2000 (actual)	2001 (est)	2002 (proposal)	2003 (plan)	2004 (plan)
Project 1 Systems analysis and impact assessment	Germplasm Improvement					
	Germplasm Collection					
	Sustainable Production	3.1	3.3	3.3	3.3	3.4
	Policy					
	Enhancing NARS	0.1	0.1	0.1	0.2	0.2
Project 2 Livestock feeds and nutrition	Germplasm Improvement	0.7	0.8	0.9	0.9	1.0
	Germplasm Collection	0.6	0.6	0.7	0.8	0.8
	Sustainable Production	1.4	1.5	1.6	1.7	2.0
	Policy					
	Enhancing NARS	0.1	0.1	0.1	0.2	0.2
Project 3 Livestock health	Germplasm Improvement					
	Germplasm Collection					
	Biotechnologies for disease control					
	Sustainable Production	5.6	5.4	5.4	5.4	5.5
	Enhancing NARS	0.2	0.2	0.2	0.2	0.2
	Integrated disease control					
	Sustainable Production	2.7	2.9	2.9	3.0	3.0
Policy	0.3	0.3	0.3	0.4	0.4	
Enhancing NARS	0.1	0.2	0.2	0.2	0.2	
Project 4 Livestock genetics and genomics	Germplasm Improvement	1.0	1.7	1.7	1.8	1.9
	Germplasm Collection	0.8	1.4	1.4	1.5	1.5
	Sustainable Production	0.5	0.8	0.8	0.8	0.8
	Policy					
	Enhancing NARS	0.1	0.2	0.2	0.2	0.2
Project 5 People, livestock and the environment	Germplasm Improvement					
	Germplasm Collection					
	Sustainable Production	3.0	3.8	3.9	3.9	4.0
	Policy	0.4	0.5	0.5	0.5	0.5
	Enhancing NARS	0.2	0.2	0.2	0.2	0.2
Project 6 Livestock policy analysis	Germplasm Improvement					
	Germplasm Collection					
	Sustainable Production					
	Policy	1.7	2.0	2.1	2.2	2.3
	Enhancing NARS	0.1	0.1	0.1	0.1	0.1
Project 7 Strengthening partnerships for livestock research	Germplasm Improvement					
	Germplasm Collection					
	Sustainable Production					
	Policy					
	Enhancing NARS	3.0	3.0	3.0	3.1	3.2
Project 8 System-wide livestock programme	Germplasm Improvement	0.2	0.1	0.5	0.5	0.5
	Germplasm Collection					
	Sustainable Production	0.9	0.3	1.0	1.0	1.0
	Policy	0.2	0.1	0.2	0.2	0.2
	Enhancing NARS	0.1	0.1	0.3	0.3	0.3

Summary by Undertaking:

	2000 (actual)	2001 (est)	2002 (proposal)	2003 (plan)	2004 (plan)
Germplasm Improvement	1.9	2.6	3.1	3.2	3.4
Germplasm Collection	1.4	2.0	2.1	2.3	2.3
Sustainable Production	17.2	18.0	18.9	19.1	19.7
Policy	2.6	2.9	3.1	3.3	3.4
Enhancing NARS	4.0	4.2	4.4	4.7	4.8
Total	27.1	29.7	31.6	32.6	33.6

Table 5. ILRI Research Agenda, 2000–2004
Investments by Sector, Commodity, and Region (in US\$ million)

Production Sectors and Commodities	2000 (actual)	2001 (est)	2002 (proposal)	2003 (plan)	2004 (plan)
<i>Germplasm Improvement</i>					
Crops					
Commodity A					
Commodity B					
Commodity C					
Commodity D					
Livestock	1.9	2.6	3.1	3.2	3.4
Trees					
Fish					
TOTAL					
1/ Sustainable Production					
Crops					
Commodity A					
Commodity B					
Commodity C					
Commodity D					
Livestock	25.2	27.1	28.5	29.4	30.2
Trees					
Fish					
TOTAL					
2/ Total Research Agenda					
Crops					
Commodity A					
Commodity B					
Commodity C					
Commodity D					
Livestock	27.1	29.7	31.6	32.6	33.6
Trees					
Fish					
TOTAL	27.1	29.7	31.6	32.6	33.6
3/ Regional	2000 (actual)	2001 (est)	2002 (proposal)	2003 (plan)	2004 (plan)
Sub-Saharan Africa (SSA)	18.2	19.9	20.8	21.5	22.1
Asia	5.7	6.2	7.0	7.5	8.1
Latin America and the Caribbean (LAC)	2.7	3.0	3.2	2.9	2.7
West Asia and North Africa (WANA)	0.5	0.6	0.6	0.7	0.7
TOTAL	27.1	29.7	31.6	32.6	33.6

1/ Includes overheads.

2/ Equals the sum of sectors/commodities in Increasing Productivity, scaled up to total investments for the Research Agenda.

3/ The regional allocation is compiled on basis of spending on research that is relevant to a region irrespective of the geographical area of actual expenditure.

Table 6. ILRI Research Agenda, 2000–2004
Expenditure by Functional Category, and Capital Investments (in US\$ million)

Object of Expenditure	2000 (actual)	2001 (est)	2002 (proposal)	2003 (plan)	2004 (plan)
Personnel	13.7	15.5	16.0	16.3	16.6
Supplies and services	9.8	11.3	12.1	12.5	13.0
Operational travel	1.6	1.4	1.4	1.4	1.6
Depreciation	2.0	1.5	2.1	2.4	2.4
TOTAL	27.1	29.7	31.6	32.6	33.6
Capital Investments	2000 (actual)	2001 (est)	2002 (proposal)	2003 (plan)	2004 (plan)
<i>Physical facilities</i>					
Research	0.2				
Training					
Administration		0.1			
Housing					
Auxiliary units					
sub-total	0.2	0.1			
<i>Infrastructure and leasehold</i>	0.1	0.2	0.2	0.1	0.2
<i>Furnishing and equipment</i>					
Farming	0.04	0.05	0.05	0.05	0.05
Laboratory and scientific	0.41	0.30	1.20	1.20	1.30
Office	0.07	0.07	0.10	0.10	0.10
Housing	0.03	0.04	0.04	0.04	0.04
Auxiliary units	0.01	0.03	0.03	0.04	0.04
Computers	0.62	0.40	0.35	0.65	0.60
Vehicles	0.32	0.30	0.25	0.24	0.25
Aircraft					
sub-total	1.5	1.2	2.0	2.3	2.4
TOTAL	1.8	1.5	2.2	2.4	2.6
Capital Fund Cash Reconciliation	2000 (actual)	2001 (est)	2002 (proposal)	2003 (plan)	2004 (plan)
<i>Balance, January 1</i>	5.9	6.1	6.6	6.5	6.5
plus: annual depreciation charge	2.0	2.0	2.1	2.4	2.4
plus / minus: disposal gains/(losses)					
plus / minus: other					
minus: asset acquisition costs	-1.8	-1.5	-2.2	-2.4	-2.6
<i>equals: Balance, December 31</i>	6.1	6.6	6.5	6.5	6.3

**Table 7. ILRI Agenda Finance and Summary Statement of Activity,
2000–2001**
(in US\$ '000)

Member	2000 (actual)		2001 (estimate)	
	(US\$)	(national currency)	(US\$)	(national currency)
Unrestricted Grants				
AUSTRALIA	222		195	
AUSTRIA	175		175	
BELGIUM	163		114	
BRAZIL	21		8	
CANADA	748		738	
CHINA	30		30	
DENMARK	534		572	
FRANCE	-		204	
FINLAND	316		319	
GERMANY	194		194	
INDIA	38		37	
IRELAND	-		361	
JAPAN	380		390	
NETHERLANDS	63		65	
NORWAY	988		981	
SWEDEN	666		943	
SWITZERLAND	915		863	
USA	2,975		2,975	
WORLD BANK	3,015		3,086	
subtotal				
	11,443		12,250	

Restricted Grants	2000 (actual)		2001 (est)	
	(US\$)	(national currency)	(US\$)	(national currency)
ADB	375		396	
AIDB	214			
AGIP	-		117	
AUSTRALIA	225		174	
BELGIUM	112		992	
CFC	67		135	
DENMARK	19		135	
EU	1,459		2,740	
FORD FOUNDATION	1,000		1,000	
FRANCE	363		233	
FINLAND	38		93	
FAO/TCP	40		41	
GEF	-		256	
GERMANY (includes US\$ 0.202 m/ US\$ 0.194 m for SLP)	575		556	
IDRC	156		367	
IFAD	531		945	
IRELAND	345			
ITALY	634		462	
JAPAN (includes US\$ 0.1 m/US\$ 0.092 m for SLP)	1,094		831	
KENYA	252		259	
KOREA			50	
LUXEMBOURG	4			
LEVERHULME TRUST	44		34	
NETHERLANDS (includes US\$ 0.113 m/ US\$ 0.108 m for SLP)	272		403	
NORWAY	175		173	
OAU/IBAR	14		300	
OPEC	70			
OTHERS	105		187	
ROCKEFELLER FOUNDATION	74		182	
SPAIN	40		40	
SWEDEN	247		112	
SWITZERLAND (includes US\$ 0.243 m/ US\$ 0.247 m for SLP)	662		809	
SOUTH AFRICA	50		70	
UNITED KINGDOM	1,828		4,093	
USA	449		327	
UNIVERSITY OF FLORIDA			40	
UNIVERSITY OF LIVERPOOL	34		5	
UNIVERSITY OF NOTTINGHAM	29		36	
WAGENINGEN			50	
WORLD BANK	256		258	
WHO	21		47	
subtotal	11,873		16,948	

TOTAL GRANTS 11,873 16,948

Summary Statement of Activity	2000 (actual)	2001 (estimate)
Member Grants	11,873	16,948
+ Centre Income (other revenues)	1,783	545
+ Indirect cost recovery	411	-
= Total Revenues	14,067	17,493
Less:		
Total Expenses	27,094	29,743
Surplus (Deficit) of total revenues over total expenses (1/)	(13,027)	(12,250.00)

1/ The deficit relates mainly to SLP funding taken into revenue in previous year but disbursed as grants to centres in 2000.

Table 8a. ILRI Allocation of Member Financing to Projects by Output, 2000
(in US\$ million)

Project	Member	Total	Outputs					
			Germplasm Improvement	Germplasm Collection	Sustainable Production	Policy	Enhancing NARS	
							Training	Other
Project 1 Systems analysis and impact assessment	Denmark	0.08			0.08			
	FAO	0.01			0.01			
	Ford Foundation	0.37			0.35		0.01	0.01
	Kenya	0.08			0.07			0.01
	Korea	0.01			0.01			
	The Netherlands	0.07			0.07			
	Rockefeller	0.06			0.06			
	South Africa	0.04			0.04			
	Switzerland	0.08			0.08			
	United Kingdom	0.57			0.55		0.01	0.01
	University of Florida	0.03			0.02			0.01
	USA	0.11			0.11			
	World Bank	0.21			0.19		0.01	0.01
	Unrestricted+centre inc.	1.48			1.46		0.02	
Total Project	3.20	0.00	0.00	3.10	0.00	0.05	0.05	
Project 2 Livestock feeds and nutrition	Australia	0.11	0.03	0.02	0.05		0.01	
	IDRC	0.07	0.02		0.04		0.01	
	Germany	0.20	0.05	0.04	0.11			
	Italy	0.29	0.07	0.06	0.14		0.01	0.01
	Spain	0.04	0.01	0.01	0.02			
	Opec	0.07	0.02	0.01	0.04			
	Others	0.07	0.02	0.01	0.04			
	South Africa	0.01			0.01			
	United Kingdom	0.03	0.01		0.02			
	Unrestricted+centre inc.	1.91	0.47	0.45	0.93		0.01	0.05
	Total Project	2.80	0.70	0.60	1.40	0.00	0.04	0.06
Project 3 Livestock health Biotechnologies for disease control Integrated disease control	Australia	0.10			0.10			
	Belgium	0.05			0.05			
	France	0.19			0.18		0.01	
	Ireland	0.23			0.21		0.01	0.01
	Italy	0.08			0.08			
	Japan	0.25			0.24		0.01	
	Kenya	0.18			0.18			
	United Kingdom	0.59			0.57		0.01	0.01
	WHO	0.03			0.03			
	IDRC	0.03			0.02		0.01	
	Belgium	0.06			0.05	0.01		
	IFAD	0.16			0.13	0.02	0.01	
	Leverhulme	0.04			0.04			
	OIE	0.02			0.01		0.01	
	OAU/IBAR	0.01			0.01			
	Others	0.01			0.01			
	United Kingdom	0.14			0.13	0.01		
	World Bank	0.08			0.07	0.01		
	Unrestricted+centre inc.	6.65			5.79	0.65	0.13	0.08
	Total Project	8.90	0.00	0.00	7.90	0.70	0.20	0.10
Project 4 Livestock genetics and genomics	Australia	0.01					0.01	
	EU	0.22	0.09	0.08	0.04			0.01
	FAO	0.03	0.01	0.01	0.01			
	France	0.04	0.02	0.02				
	Germany	0.05	0.02	0.02	0.01			
	Ireland	0.12	0.05	0.05	0.02			
	Italy	0.02	0.01	0.01				
	Japan	0.45	0.18	0.16	0.09		0.01	0.01
	Korea	0.04	0.02	0.01	0.01			
	Others	0.03	0.01	0.01	0.01			
	Sweden	0.03	0.01	0.01	0.01			
	United Kingdom	0.36	0.14	0.12	0.07		0.02	0.01
	University of Liverpool	0.03	0.01	0.01	0.01			
	University of Nottingham	0.03	0.01	0.01	0.01			
	USA	0.03	0.01	0.01	0.01			
	WHO	0.03	0.01	0.01	0.01			
	Unrestricted+centre inc.	0.88	0.40	0.26	0.19		0.01	0.02
Total Project	2.40	1.00	0.80	0.50	0.00	0.05	0.05	

Project	Member	Total	Outputs					Enhancing NARS	
			Germplasm Improvement	Germplasm Collection	Sustainable Production	Policy	Training	Other	
			Project 5 People, livestock and the environment	ADB	0.35			0.30	0.04
	AfDB	0.21			0.19	0.02			
	EU	0.03			0.03				
	Ford Foundation	0.45			0.38	0.04	0.02	0.01	
	Germany	0.19			0.16	0.02	0.01		
	IFAD	0.37			0.32	0.04	0.01		
	IDRC	0.06			0.05	0.01			
	Italy	0.13			0.11	0.02			
	Japan	0.24			0.20	0.04			
	The Netherlands	0.06			0.05	0.01			
	Others	0.02			0.02				
	United Kingdom	0.04			0.03	0.01			
	World Bank	0.03			0.03				
	USA	0.08			0.08				
	Unrestricted+centre inc.	1.34			1.05	0.15	0.05	0.09	
	Total Project	3.60	0.00	0.00	3.00	0.40	0.10	0.10	
Project 6 Livestock policy analysis	CFC	0.07				0.06	0.01		
	Ford Foundation	0.18				0.17	0.01		
	France	0.12				0.12			
	Germany	0.04				0.04			
	Italy	0.11				0.11			
	Norway	0.18				0.17	0.01		
	Switzerland	0.32				0.30	0.01	0.01	
	USA	0.02				0.02			
	World Bank	0.15				0.14	0.01		
	Unrestricted+centre inc.	0.61				0.57	0.02	0.02	
	Total Project	1.80	0.00	0.00	0.00	1.70	0.07	0.03	
Project 7 Strengthening partnerships for livestock research	Luxembourg	0.01					0.01		
	Sweden	0.22					0.11	0.11	
	South Africa	0.02					0.01	0.01	
	USA	0.19					0.10	0.09	
	Unrestricted+centre inc.	2.56					1.17	1.39	
	Total Project	3.00	0.00	0.00	0.00	0.00	1.40	1.60	
Project 8 System-wide livestock programme	Germany	0.20	0.03		0.13	0.03	0.01		
	Japan	0.10	0.02		0.06	0.02			
	The Netherlands	0.11	0.02		0.06	0.02		0.01	
	Switzerland	0.24	0.04		0.15	0.03	0.01	0.01	
	World Bank	0.74	0.09		0.50	0.10	0.03	0.03	
	Total Project	1.60	0.23	0.00	1.03	0.23	0.05	0.05	

Centre totals	Total	Outputs					Enhancing NARS	
		Germplasm Improvement	Germplasm Collection	Sustainable Production	Policy	Training	Other	
Total targeted funding	12.1	1.3	0.7	7.5	1.7	0.6	0.4	
Total unrestricted funding	13.0	0.7	0.7	7.7	1.0	1.4	1.5	
Total centre income and indirect cost recovery	2.2			2.1			0.1	
Total allocations	27.3	1.9	1.4	17.3	2.6	2.0	2.0	

Note: This table is required, for prior and plan years only (i.e. tables 8a and 8b), in the Financing Plan submission (September)

Table 8b. ILRI Allocation of Member Financing to Projects by Output, 2001
(in US\$ million)

Project	Member	Total	Outputs						
			Germplasm Improvement	Germplasm Collection	Sustainable Production	Policy	Enhancing NARS		
							Training	Other	
Project 1 Systems analysis and impact assessment	Denmark	0.12			0.11		0.01		
	Finland	0.09			0.09				
	Ford Foundation	0.40			0.38		0.01	0.01	
	Japan	0.05			0.05				
	Kenya	0.08			0.08				
	The Netherlands	0.14			0.13		0.01	0.00	
	Others	0.06			0.06				
	Rockefeller	0.24			0.23			0.01	
	South Africa	0.05			0.05				
	Switzerland	0.10			0.10				
	United Kingdom	0.98			0.94		0.02	0.02	
	University of Florida	0.04			0.04			0.00	
	Unrestricted+centre inc.	1.05			1.04			0.01	
Total Project	3.40	0.00	0.00	3.30	0.00	0.05	0.05		
Project 2 Livestock feeds and nutrition	Australia	0.05	0.02	0.01	0.02				
	EU	0.72	0.18	0.14	0.36		0.02	0.02	
	IFAD	0.04	0.01	0.01	0.02				
	IDRC	0.12	0.03	0.03	0.06				
	Italy	0.12	0.04	0.02	0.06				
	Kenya	0.01	0.00		0.01				
	Korea	0.02	0.01	0.00	0.01				
	Spain	0.04	0.01	0.01	0.02				
	Switzerland	0.02	0.00	0.00	0.02				
	United Kingdom	0.14	0.04	0.03	0.07				
	Others	0.01		0.01					
	Unrestricted+centre inc.	1.72	0.46	0.34	0.85		0.03	0.03	
	Total Project	3.00	0.80	0.60	1.50	0.00	0.05	0.05	
Project 3 Livestock health Biotechnologies for disease control Integrated disease control	Belgium	0.81			0.77		0.02	0.02	
	EU	0.61			0.58		0.02	0.01	
	France	0.15			0.15				
	Ireland	0.22			0.20		0.01	0.01	
	Italy	0.08			0.08				
	Japan	0.18			0.18				
	Kenya	0.17			0.17				
	Korea	0.02			0.02				
	Leverhulme	0.03			0.03				
	United Kingdom	2.48			2.42		0.02	0.04	
	WHO	0.05			0.05				
	Others	0.14			0.12	0.02			
	EU	0.09			0.07	0.02			
	IDRC	0.03			0.02	0.01			
	IFAD	0.50			0.42	0.06	0.01	0.01	
	OAU/IBAR	0.03			0.02	0.01			
	The Netherlands	0.07			0.06	0.01			
	United Kingdom	0.50			0.43	0.05	0.01	0.01	
	Unrestricted+centre inc.	2.84			2.51	0.12	0.11	0.10	
	Total Project	9.00	0.00	0.00	8.30	0.30	0.20	0.20	
	Project 4 Livestock genetics and genomics	Australia	0.07	0.04	0.02	0.01			
		Belgium	0.18	0.08	0.06	0.04			
		EU	0.47	0.19	0.17	0.09		0.01	0.01
FAO		0.03	0.01	0.01	0.01				
France		0.02	0.01	0.01					
Germany		0.18	0.07	0.06	0.04		0.01		
IFAD		0.02	0.02						
Italy		0.02	0.01	0.01					
Japan		0.32	0.12	0.11	0.06		0.01	0.02	
Korea		0.02	0.01	0.01					
The Netherlands		0.08	0.02	0.04	0.02				
United Kingdom		0.31	0.12	0.11	0.06		0.01	0.01	
Sweden		0.05	0.02	0.02	0.01				
University of Liverpool		0.01		0.01					
University of Nottingham		0.04	0.01	0.01	0.02				
Others		0.11	0.05	0.04	0.02				
Unrestricted+centre inc.		2.17	0.92	0.71	0.42		0.06	0.06	
Total Project	4.10	1.70	1.40	0.80	0.00	0.10	0.10		

Project	Member	Total	Outputs					
			Germplasm	Germplasm	Sustainable	Policy	Enhancing NARS	
			Improvement	Collection	Production		Training	Other
Project 5 People, livestock and the environment	ADB	0.34			0.29	0.03	0.01	0.01
	AGIP	0.12			0.10	0.01		0.01
	Denmark	0.02			0.01	0.01		
	EU	0.51			0.44	0.05	0.01	0.01
	Ford Foundation	0.42			0.36	0.04	0.01	0.01
	Germany	0.14			0.12	0.02		
	GEF	0.26			0.22	0.02	0.01	0.01
	IDRC	0.22			0.18	0.02	0.01	0.01
	IFAD	0.31			0.26	0.03	0.01	0.01
	Italy	0.14			0.12	0.02		
	Japan	0.13			0.11	0.02		
	OAU/IBAR	0.28			0.23	0.03	0.01	0.01
	Others	0.05			0.04	0.01		
	Sweden	0.07			0.06	0.01		
	The Netherlands	0.01			0.01			
United Kingdom	0.09			0.07	0.02			
Unrestricted+centre inc.	1.49			1.28	0.16	0.03	0.02	
Total Project	4.60	0.00	0.00	3.90	0.50	0.10	0.10	
Project 6 Livestock policy analysis	CFC	0.14				0.13		0.01
	Ford Foundation	0.18				0.17	0.01	
	France	0.05				0.05		
	Germany	0.01				0.01		
	Italy	0.10				0.09	0.01	
	Norway	0.17				0.16		0.01
	Switzerland	0.36				0.34	0.01	0.01
	United Kingdom	0.02				0.02		
	USA	0.01				0.01		
	Wageningen	0.05				0.05		
	World Bank	0.09				0.09		
	Unrestricted+centre inc.	0.92				0.88	0.02	0.02
Total Project	2.10	0.00	0.00	0.00	2.00	0.05	0.05	
Project 7 Strengthening partnerships for livestock research	ADB	0.05					0.03	0.02
	Australia	0.02					0.01	0.01
	EU	0.33					0.17	0.16
	Germany	0.03					0.02	0.01
	South Africa	0.02					0.01	0.01
	Sweden	0.16					0.08	0.08
	USA	0.17					0.08	0.09
	Unrestricted+centre inc.	2.22					1.10	1.12
Total Project	3.00	0.00	0.00	0.00	0.00	1.50	1.50	
Project 8 System-wide livestock programme	Germany	0.19	0.03		0.13	0.03		
	Japan	0.09	0.01		0.06	0.02		
	The Netherlands	0.11	0.02		0.07	0.02		
	Switzerland	0.21	0.04		0.04	0.03	0.05	0.05
Total Project	0.60	0.10	0.00	0.30	0.10	0.05	0.05	

Centre totals	Total	Outputs					
		Germplasm	Germplasm	Sustainable	Policy	Enhancing NARS	
		Improvement	Collection	Production		Training	Other
Total targeted funding	17.0	1.2	0.9	11.8	1.7	0.6	0.7
Total unrestricted funding	12.2	1.4	1.1	5.8	1.2	1.3	1.4
Total centre income	0.5			0.4		0.1	
Total allocations	29.7	2.6	2.0	18.0	2.9	2.1	2.1

Table 9. ILRI Research Agenda Staff Composition, 2000–2004

	2000 (actual)		2001 (est)		2002 (proposal)		2003 (plan)		2004 (plan)	
	Hired by:		Hired by:		Hired by:		Hired by:		Hired by:	
	centre	other	centre	other	centre	other	centre	other	centre	other
Internationally Recruited Staff (IRS)										
Research and Research Support	71	14	85	12	93	22	103	25	103	25
<i>of which:</i>										
<i>Post-doctoral Fellows</i>	8	2	14	1	14		15		15	
<i>Associate Professionals</i>	16	12	14	11	20	15	25	15	25	15
Training/Communications	9		6		7		7		7	
<i>of which:</i>										
<i>Post-doctoral Fellows</i>										
<i>Associate Professionals</i>	3		0		1		1		1	
Research Management	11		11		10		10		10	
<i>of which:</i>										
<i>Post-doctoral Fellows</i>										
<i>Associate Professionals</i>	3		3		1					
Total IRS	91		102		110		120		120	
Support Staff	708		711		715		715		715	
TOTAL STAFF	799	14	813	12	825	22	835	25	835	25

Definitions

Internationally Recruited Staff (IRS)

This category includes staff who carry out highly technical/senior functions, as defined by the centre, and they may include personnel hired in the local or regional labour market. Included in this group, but shown separately, are post-doctoral fellows and associate professionals (who may have other titles in different centres), and who often are staff provided by donors as part of a project or other institutional arrangement. Costs for consultants engaged for specific tasks are not personnel expenses and the individuals are not staff; their costs should be calculated in the 'supplies and services' category.

Support Staff

This category includes the numerical majority, in many cases, of personnel at a centre. These are usually, but not necessarily always, individuals hired in the local labour market. They carry out functions which require less demanding skills than for the IRS category. The support staff category does not include seasonal field labour or other individuals engaged on a purely contract basis, for example when a centre contracts with an employment agency to provide security, janitorial and other services. Such costs should be calculated in the 'supplies and services' category.

**Table 10. ILRI Cash Requirement, Revenue Flow and Currency Shares,
2000–2002
(in US\$ million)**

Monthly Cash Uses and Sources

2000	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Cash requirement	2.069	2.245	2.938	1.922	2.281	2.361	1.250	2.726	2.996	2.465	2.415	2.059
Member and centre income	1.826	2.300	2.200	2.408	2.820	2.340	0.684	0.569	2.250	1.450	2.605	0.439
Net monthly position	-0.243	0.055	-0.738	0.486	0.539	-0.021	-0.566	-2.157	-0.746	-1.015	0.190	-1.620
Accumulated position	15.942	15.997	15.259	15.745	16.284	16.263	15.697	13.540	12.794	11.779	11.969	10.349

2001	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Cash requirement	2.156	2.025	2.138	2.322	1.616	1.316	0.750	1.726	1.996	2.165	2.415	2.059
Member and centre income	3.254	2.500	2.200	2.100	2.277	2.340	0.684	0.569	1.750	2.350	2.826	2.425
Net monthly position	1.098	0.475	0.062	-0.222	0.661	1.024	-0.066	-1.157	-0.246	0.185	0.411	0.366
Accumulated position	11.447	11.922	11.984	11.762	12.423	13.447	13.381	12.224	11.978	12.163	12.574	12.940

2002	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Cash requirement	2.106	2.245	2.138	2.522	2.499	2.266	0.881	1.226	1.996	1.965	2.215	1.859
Member and centre income	2.254	2.100	2.200	2.408	2.320	2.340	0.684	0.569	1.950	2.250	2.392	2.233
Net monthly position	0.148	-0.145	0.062	-0.114	-0.179	0.074	-0.197	-0.657	-0.046	0.285	0.177	0.374
Accumulated position	13.088	12.943	13.005	12.891	12.712	12.786	12.589	11.932	11.886	12.171	12.348	12.722

Currency Structure of Expenditures

Currency	2000 (actual)			2001 (estimate)			2002 (proposal)		
	Amount	\$ value	% share	Amount	\$ value	% share	Amount	\$ value	% share
US Dollar		16.5	60%		17.6	60%		18.9	60%
Ksh	340	5.9	22%		6.6	22%		7.0	22%
Birr	30	3.2	12%		3.7	12%		3.9	12%
UK Sterling	1	1	4%		1.2	4%		1.2	4%
Others	note 1/	0.5	2%		0.6	2%		0.6	2%
TOTAL		27.1	100%		29.7	100%		31.6	100%

Notes:

1/ All other currencies the sum of which accounts for less than 5% of total expenditure.

Table 11. ILRI Statement of Financial Position, 2000–2004

(in US\$ '000)

	2000 (actual)	2001 (est)	2002 (proposal)	2003 (plan)	2004 (plan)
Assets					
Current Assets					
Cash and cash equivalents	10,349	12,940	12,722	12,496	12,322
Accounts receivable					
Donors	4,724	2,974	3,445	3,774	3,828
Employees	636	130	128	128	128
Other	1,188	750	850	950	1,050
Inventories	1,378	1,432	1,430	1,400	1,400
Prepaid expenses	235	345	365	445	445
Other current assets					
Total Current Assets	18,510	18,571	18,940	19,193	19,173
Fixed Assets					
Property, plant and equipment	54,325	56,032	58,839	61,439	64,239
Less: Accumulated depreciation	-34,845	-35,371	-38,071	-40,471	-42,871
Total Fixed Assets - Net	19,480	20,661	20,768	20,968	21,368
Total Assets	37,990	39,232	39,708	40,161	40,541
Liabilities and Net Assets					
Current Liabilities					
Bank Indebtedness					
Accounts payable					
Donors	1,863	1,241	1,107	1,107	1,107
Employees	1,803	845	900	900	900
Others	1,506	1,110	1,170	1,170	1,185
Accruals and provisions	2,229	3,981	3,981	3,981	3,981
In-trust accounts	339	325	280	280	275
Total Current Liabilities	7,740	7,502	7,438	7,438	7,448
Non Current Liabilities	501	600	650	650	650
Total Liabilities	8,241	8,102	8,088	8,088	8,098
Net Assets					
Unrestricted					
Appropriated	20,013	20,661	20,768	20,968	21,368
Unappropriated	9,736	10,469	10,852	11,105	11,075
Total Net Assets	29,749	31,130	31,620	32,073	32,443
Total Liabilities and Net Assets	37,990	39,232	39,708	40,161	40,541

Annexes

Annex I. Project portfolio 2002–2004: Project descriptions and logical frameworks

ILRI logframe

Systems analysis and impact assessment

Livestock feeds and nutrition

Livestock health

 Biotechnologies for disease control

 Integrated disease control

Livestock genetics and genomics

People, livestock and the environment

Livestock policy analysis

Strengthening partnerships for livestock research

System-wide Livestock Programme

International Livestock Research Institute

Hierarchy of activities/objectives	Indicators	Assumptions	Indicators for assumptions
<p>Goal Poverty, hunger and environmental degradation in developing countries are reduced through sustainable livestock production</p>	<ul style="list-style-type: none"> • Reduced poverty and environmental degradation with increased food security in agricultural systems with livestock components in the developing world 		
<p>Intermediate goal</p> <ul style="list-style-type: none"> • Livelihoods of resource-poor livestock keepers are sustainably improved • Animal products are more affordable and accessible for the poor • Natural resources are sustainably used and conserved in developing countries 	<ul style="list-style-type: none"> • Livestock productivity in target systems increased • Income derived from livestock in smallholder systems increased • Contribution of livestock to trade increased • Food security and improved nutrition and health of poor people enhanced • Livestock practices used by smallholders in marginal areas are sustainable • Land and water resources involving livestock more effectively used 		
<p>Purpose Technological and policy options developed through partnerships and alliances used by stakeholders to improve livestock productivity and conserve natural resources</p>	<ul style="list-style-type: none"> • Products from all successful ILRI programmes are being adopted and implemented 	<p>Assumptions for achievement of intermediate goal</p> <ul style="list-style-type: none"> • Partners transfer options and technologies to direct beneficiaries • Livestock are fully integrated into other agricultural systems 	<ul style="list-style-type: none"> • Technologies generated through ILRI's research are in use at the farm level in 20 targeted areas
<p>Outputs</p> <ul style="list-style-type: none"> • Information that can be used to select more productive and disease resistant livestock and forages • Affordable technologies and methodologies to improve livestock productivity and reduce effects of disease and undernutrition • Improved targeting and delivery of interventions to stakeholders in evolving agricultural systems • Management practices, technologies, policies and research methodologies for sustainable use of the natural resource base supporting agricultural systems involving livestock • Policy options which support sustainable livestock development • Knowledge and capacity development for livestock research and development provided • Appropriate technical, financial and organisational conditions for ILRI's programme implementation 	<p>Through partnerships and alliances</p> <ul style="list-style-type: none"> • Increased use of indigenous breeds and forages for livestock production in at least 20 countries by 2010 • Losses due to trypanosomosis, helminths and tick-borne diseases in target systems in sub-Saharan Africa decreased by 5% by 2005 • Losses due to poor nutrition in benchmark sites decreased by 5% by 2005 • ILRI developed technologies and policy options available for target livestock systems by 2010 • Degradation of resources in crop–livestock and grazing systems in developing countries reduced by 5% by 2010 • Policy options and market reforms available for use by national policy makers in target regions by 2010 • Number of trained NARS staff increased by 10% in targeted regions • Resources mobilised to reach the CGIAR recommended target of 9.3% of CGIAR income for livestock by 2005 • Timely programme planning, monitoring and review implemented annually • Streamlined institute structure in place and efficient corporate services support programme implementation by 2002 	<p>Assumptions for achievement of purpose</p> <ul style="list-style-type: none"> • Governments provide enabling policy and regulatory environment for the adoption of innovations by NARS • Natural disasters do not overtake research sites and the smallholder systems in which interventions will be adopted • Demand for livestock products will increase as projected and pricing structure will encourage expansion of smallholder systems 	<ul style="list-style-type: none"> • Government policies support the livestock sector in all regions • Livestock sector in developing countries continues to expand

Key assumption: Demand for and access to livestock products is maintained

Project 1. Systems analysis and impact assessment

Objective

This activity contributes, through the use of *ex ante* and *ex post* impact assessment, to ILRI's ability to identify researchable issues that will, if resolved, enhance livestock productivity and increase overall agricultural productivity, reduce poverty and maintain the natural resource base. The research is concerned with characterising and understanding the evolution of livestock systems, and evaluating and quantifying the socio-economic and environmental impacts of potential interventions. The objective is to improve the targeting and delivery of these interventions to stakeholders.

Outputs

- A livestock-based priority setting framework developed, maintained and applied that takes account of impacts on poverty, the environment and food security (with projects 5 and 6)
- Methodologies, models and decision support systems that allow evaluation of potential biophysical, economic, social and environmental effects of interventions in dairy and crop–livestock production systems (with projects 5 and 6)
- Information, knowledge and capacity development for systems analysis and impact assessment work provided to partners (with projects 7 and 8)

Gains (impact)

Identification of constraints and possible impact will permit development of more appropriate and targeted policy options and technologies, providing greater economic returns to investment in livestock research and alleviating poverty. Increased impact will consequently lead to measurable increases in investment in livestock research in the coming years.

Duration—Five years

Milestones

- 2002 Transregional analysis of smallholder dairy systems in sub-Saharan Africa, Latin America and Asia completed. Rapid impact assessment methods developed and undergoing field-testing with partners in case study sites
- 2003 *Ex post* impacts of production interventions for smallholder dairy assessed at benchmark sites. Crop–livestock, ecosystem and land-use models applied transregionally, to explore system changes and system evolution within an ecoregional context for priority setting and impact assessment
- 2004 *Ex post* impacts of market interventions for smallholder dairy assessed at benchmark sites

Users—Decision makers in donor agencies, international and national research and development organisations including ILRI, and other stakeholders

Collaborators

NARS partners: Kenya, Tanzania, Uganda, Ethiopia, Malawi, Zimbabwe, Burkina Faso, Côte d'Ivoire, The Gambia, South Africa; DRSRS, Kenya; SARI, Tanzania; DRSS, University of Zimbabwe, Zimbabwe

ARI partners: Wageningen Agricultural University, The Netherlands; FAO, Italy; ICIPE, Kenya; ARC, South Africa; Natural Resources Institute, University of Edinburgh, University of Newcastle, UK; Colorado State University, Cornell University, Michigan State University, NCGIA, University of Florida, University of Georgia, University of Hawaii, World Resources Institute, USA

CGIAR partners: CIAT, CIMMYT, CIP, ICARDA, ICRAF, ICRISAT, IFPRI, IITA, IRRI

Regional and ecoregional partners: ICASA, ecoregional consortia

Outsourcing: University of Georgia, USA

Cost—US\$ 3.4 million in 2002 increasing to US\$ 3.6 million in 2004

System linkages—Sustainable production and enhancing NARS

Systems analysis and impact assessment

Hierarchy of activities/objectives	Indicators	Assumptions	Indicators for assumptions
<p>Goal Poverty, hunger and environmental degradation reduced through better understanding of agricultural systems and improved targeting of more appropriate technology and policy options</p>	<ul style="list-style-type: none"> Reduced poverty and environmental degradation and increased food security in the developing world Increased and faster adoption of livestock-related technologies 		
<p>Intermediate goal Livelihoods of resource-poor livestock keepers are sustainably improved, animal products are more affordable and accessible for the poor, and natural resources are conserved in developing countries, resulting from more efficient and effective livestock research being undertaken by ILRI and partners</p>	<ul style="list-style-type: none"> Average income for livestock-keeping households increased Nutritional status of family enhanced in livestock-keeping households Income variability and calorific intake variability decreased in livestock keeping households 		
<p>Purpose Targeted and improved delivery of technological and policy options developed through partnerships and alliances used by stakeholders to improve livestock productivity while conserving natural resources</p>	<ul style="list-style-type: none"> ILRI's published impact analyses are cited by partners and other research organisations New research activities initiated by ILRI and partners attributable at least in part to impact assessment Priority setting mechanisms institutionalised in NARS and NGO partner organisations 	<p>Assumptions for achievement of intermediate goal</p> <ul style="list-style-type: none"> Livestock continue to be an important component in smallholder systems in ILRI's target areas Partners transfer tools, methods, options and technologies to direct beneficiaries 	<ul style="list-style-type: none"> ILRI technologies are in use at the farm level in targeted areas
<p>Outputs</p> <ul style="list-style-type: none"> A practical livestock-based priority setting framework developed, maintained and applied Methodologies and decision support systems that allow evaluation of potential biophysical, economic, social and environmental effects of livestock interventions, leading to strategies, policies and recommendations at different stakeholder levels <i>Ex ante</i> and <i>ex post</i> impact assessments Characterisation of global livestock systems Understanding how systems evolve in response to change Knowledge and capacity development for systems analysis and impact assessment work provided 	<ul style="list-style-type: none"> Priority setting framework applied by at least one partner organisation by 2002 Models and methods tested in four case study locations by 2003, explaining at least 70% of the variation observed in land use, productivity and technology adoption Options for changes in livestock sector practices and policies available by 2003 Two ILRI Impact Assessment Series reports published per year; results published internationally if appropriate Transregional analysis of smallholder dairy systems in sub-Saharan Africa, Latin America and Asia published Target country NARS partners trained in systems analysis and impact assessment increased by 10% by 2004 	<p>Assumptions for achievement of purpose</p> <ul style="list-style-type: none"> Data, methods and recommendations being generated continue to be useful and needed by national partners and others NARS have the resources to retain and use trained staff 	<ul style="list-style-type: none"> Needs assessments are carried out, and show that information is generated in response to the needs of partners Global databases can continue to be accessed in collaboration with partners Credible analyses are being published in peer-reviewed journals and the results are shown to be used to inform decision making

Activities	Milestones	Preconditions for implementation of activities	Indicators
<ul style="list-style-type: none"> • Collection, collation, storage, management and dissemination of primary and secondary data at multiple scales • Development of tools, building of models, development of improved methodologies for rapid impact assessment (RIA) • Integration of crop–livestock models for studying trade-offs in resource use, and development and validation of dynamic/spatial models that predict systems evolution • Assess impacts of system interventions on poverty, environment and food security • Analysis and prediction of evolution of systems, including identification of minimum characterisation data sets at different levels of aggregation, leading to transregional analysis • Disseminate information to policy makers, hold participatory stakeholder workshops, and undertake participatory modelling with stakeholders • Graduate students and partner technical staff are integrated into research projects 	<ul style="list-style-type: none"> • ILRI databases on WWW and CD-ROM by early 2002 • A set of RIA methods being field tested at two case studies sites by end of 2002 • Crop–livestock models used in at least three <i>ex ante</i> impact studies by mid-2002, including one on livestock disease control • Systems evolution model developed for two case study sites by the end of 2002 • Priority setting framework in use in subsequent MTP revisions in 2002 and 2003 • One new <i>ex post</i> study and three new <i>ex ante</i> studies carried out and published by 2003 • Initial recommendation domains identified for teams in SSA, LAC and Asia by mid-2002 • Dynamic recommendation domains defined for one case study crop–livestock system in East Africa by mid-2002 • ILRI's transregional analysis approach and results published by mid-2003 • One participatory modelling workshop held each year to 2003 	<ul style="list-style-type: none"> • Collaborative relationships with data sources developed and maintained • Adequate secondary data exist • Adequate resources continue to be available for activities • GIS and modelling technologies continue to become more powerful and accessible to more users 	<ul style="list-style-type: none"> • Collaboration increases with a greater number of partners globally, and interchange of databases increases • Project funding for these activities increases over time • GIS and modelling techniques are used by more projects within ILRI. An increasing number of research teams both within and outside ILRI have direct access to GIS expertise

Project 2. Livestock feeds and nutrition

Objective

Ruminants in developing countries depend primarily on native pastures and cultivated forages including cereal and legume residues, and increasingly, fodder trees and shrubs. Feed scarcity and poor nutritional quality are major constraints to increasing productivity. The presence of anti-nutritional factors (ANFs) further limits the ability of livestock to utilise tropical feeds. However, adapted wild and domesticated ruminants have evolved fermentation mechanisms to overcome the effect of the ANFs and, perhaps, also to utilise fibrous feeds more efficiently. Exploitation of these mechanisms will enable livestock to better utilise the feeds available. Increased uptake of cultivated forages and fodder trees and shrubs of superior quality will help improve year-round feed supply. Selection of animals that more effectively utilise feed nutrients is another possible approach. The objectives are to mitigate the effects of inadequate nutrition through identifying opportunities to improve the quantity and quality of livestock feeds and their utilisation.

Outputs

- Strategies and methods to screen and conserve forage biodiversity (with projects 1 and 5)
- Genetic markers identified and crop genotypes selected for superior quantity and/or quality of their residues (with projects 1, 4 and 8)
- Participatory rural approaches for identifying, evaluating and promoting desirable traits of feed resources (with project 1)
- Strategies and methods to collect, isolate and characterise rumen microbes that enhance the capacity of ruminants to utilise tropical feeds (with project 4)
- Strategies to improve the efficiency of utilisation of energy and protein by tropical ruminants (with projects 1, 6 and 7)

Gains (impact)

Enhanced availability and efficiency of utilisation of feed resources will lead to increased productivity of meat and milk by livestock, which will result in higher incomes, better nutrition and improved food security.

Duration—Ten years.

Milestones

- 2002 Approaches and methods for screening and evaluating forage germplasm tested; toxic compounds in accessions of one tropical fodder tree identified; environmental and genetic effects on feed quality of crop residues estimated; genotype–disease–nutrition interactions appraised
- 2003 Collection of forage germplasm conserved and characterised; strains of rumen microbes characterised; candidate genetic markers of feed quality traits identified in crop residues
- 2004 Libraries of forage germplasm available, best bet forages for key agro-ecological zones and production systems and superior strains of rumen microbes identified; effect of candidate genetic markers of feed quality traits of crop residues estimated

Users—NARS, ecoregional consortia, NGOs, private sector. Beneficiaries: smallholder farmers.

Collaborators

NARS partners: INERA-BF, Burkina Faso; Addis Ababa University, Alemaya University, EARO, MoA, Ethiopia; ICAR, India; BPT, IPB, Indonesia; KARI, Kenya; IER, Mali; INRAN, Niger; NAPRI, Nigeria; ISRA, Senegal; Irene Animal Production Institute, South Africa; University of Zimbabwe, Zimbabwe

ARI partners: ACIAR, CSIRO, La Trobe University, Universities of Adelaide, Queensland and Western Australia, Australia; CIRAD-EMVT, France; Sasakawa-Global 2000, Japan; Federal Institute of Technology, Switzerland; CTVM, NRI, The Rowett Research Institute, University of Reading, UK; Cornell University, TIGR, University of Wisconsin-Madison, USDA–ARS, USA

CGIAR partners: CIAT, CIMMYT, CIP, ICARDA, ICRAF, ICRISAT, IITA, IPGRI, IRRI, SGRP, SLP

Regional and ecoregional partners: DMP, EPHTA, Rice–Wheat Consortium, TROPILECHE, CONDESAN, SADC regional genetic resources programme

Cost—US\$ 3.3 million in 2002, increasing to US\$ 4 million in 2004

System linkages—Germplasm improvement, germplasm collection, sustainable production and enhancing NARS

Livestock feeds and nutrition

Hierarchy of activities/objectives	Indicators	Assumptions	Indicators for assumptions
<p>Goal Poverty, hunger and environmental degradation reduced through the mitigation of the effects of inadequate livestock nutrition on productivity and sustainability of smallholder livestock producers</p>	<ul style="list-style-type: none"> • Reduced poverty and environmental degradation and increased food security in the developing world 		
<p>Intermediate goal Livelihoods of resource-poor livestock keepers are sustainably improved, animal products are more affordable and accessible for the poor, and natural resources are conserved in developing countries through improved availability and efficiency of utilisation of feed resources</p>	<ul style="list-style-type: none"> • Average income for livestock-keeping households increased • Nutritional status of family enhanced in livestock-keeping households • Income variability and calorific intake variability decreased in livestock keeping households • Environmental degradation reduced 		
<p>Purpose National research organisations, development agencies in the livestock sector, and smallholder livestock producers promote and (or) use sown forages, crops improved for feeding value of their residues, superior strains of rumen microbes, and feeding management strategies that increase livestock productivity</p>	<ul style="list-style-type: none"> • At least five additional national research organisations in at least five countries apply research strategies for conserving forage biodiversity and at least five additional research institutes apply PRA and crop improvement for feed value by 2003 • NARS and development agencies in at least 10 countries promote improved livestock nutrition by 2005 	<p>Assumptions for achievement of intermediate goal</p> <ul style="list-style-type: none"> • Livestock services related to improved nutrition, such as the feed industry and the seed sector (for crops and forages) are supported by governments • NARS are effectively supported by governments 	<ul style="list-style-type: none"> • Livestock extension services, feed industry and related services are functional and effective in at least 10 developing countries by 2005 • Increase in budgets of NARS involved in livestock research by 2003

<p>Outputs</p> <ul style="list-style-type: none"> • Strategies and methods to screen and conserve forage biodiversity (with projects 1 and 5) • Genetic markers identified and crop genotypes selected for superior quantity and/or quality of their residues (with projects 1, 4 and 8) • Participatory rural approaches for identifying, evaluating and promoting desirable traits of feed resources (with project 1) • Strategies and methods to collect, isolate and characterise rumen microbes that enhance the capacity of ruminants to utilise tropical feeds (with project 4) • Strategies to improve the efficiency of utilisation of energy and protein by tropical ruminants (with projects 1, 6 and 7) 	<p>Indicators</p> <ul style="list-style-type: none"> • Diverse collection of forage germplasm conserved and characterised and available for use by 2003 • Estimates of genetic and environmental effects on quality of crop residues made available by 2003 and genetic markers identified by 2005 • At least one genotype of pearl millet, one of sorghum and one of cowpea with superior feed value identified by 2005 • PRA approaches related to feed characterisation and improvement used at least by 5 NARS by 2005 • Methods to characterise rumen microbes used at least by 5 research organisations by 2005 • At least one strain of rumen bacteria with potential to tolerate or degrade anti-nutritional factors identified by 2003 • At least one nucleic acid probe to track resistance to anti-nutritional factors developed by 2003 • The toxin in <i>Acacia</i> isolated and identified by 2002 • At least one compound in tropical forages with anti-protozoal or anti-microbial activity identified and characterised by 2005 • Recommended strategies to improve utilisation of nutrients by indigenous and crossbred ruminants applied at least by 5 NARS by 2006. 	<p>Assumptions for achievement of purpose</p> <ul style="list-style-type: none"> • Functional partnerships with NARS, IARCs and research organisations in developed countries are established • Effective collaboration with other ILRI programmes is established • Convention on Biological Diversity and intellectual property rights do not limit access to forage genetic resources and rumen microbes 	<p>Indicators for assumption</p> <ul style="list-style-type: none"> • Memoranda of understanding signed with at least five NARS, IARCs and ARIs and put in operation in at least three countries • At least three cross-programme projects involving feed resources and animal nutrition research are conducted in ILRI in Africa, Asia and Latin America by 2001 • At least three multi-institutional projects on feed resources and animal nutrition research are under execution by 2002 • At least five countries hosting ILRI and its partners sign and adhere to the Convention on biological diversity and intellectual property rights
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Activities	Milestones	Preconditions for implementation of activities	Indicators
<ul style="list-style-type: none"> • Characterise and conserve forage genetic resources for use as livestock feed • Assess genetic and environmental (crop management) influences on quality of crop residues • Development of tools for crop breeders to identify genotypes of superior fodder properties and inclusion of these traits in crop breeding programmes • Identify and evaluate desirable traits in feed resources by using participatory rural approaches, feed evaluation techniques and molecular characterisation of crop residues • Identify and characterise rumen microbes with capacity to tolerate or degrade anti-nutritional factors present in tropical forages • Identify, isolate and characterise compounds in tropical plants with anti-protozoal effects in the rumen. • Evaluate strategies to improve the utilisation of energy and protein by indigenous and crossbred ruminants in the tropics 	<ul style="list-style-type: none"> • At least 20,000 accessions held in trust in the ILRI gene bank by 2003 and 1000 accessions fully characterised and seeds available for use by NARS by 2005 • Quantitative estimates of variation in yield and quality of crop residues due to genetic and environmental factors • Methods developed for selection for fodder value used at least by three breeding programmes by 2005 • Yield and (or) quality of superior crop cultivars at least 10% higher than non-improved counterparts • Approaches developed used by at least five NARS and three IARCs or institutions in developed countries • At least one strain of rumen bacteria with potential to tolerate or degrade anti-nutritional factors identified by 2003 • At least one nucleic acid probe to track resistance to anti-nutritional factors developed by 2003 • At least one toxic compound in one species (<i>Acacia</i>) identified by 2002 and isolated by 2003 • At least one compound in tropical forages with anti-protozoal or anti-microbial activity identified and characterised by 2005 • One report of genetics–nutrition–disease interaction available by 2002 • Meat and milk output increases of 10% obtained in response to better nutrition by 2006 	<ul style="list-style-type: none"> • Funding to project is adequate • Staffing of project is adequate • Access to study sites is not constrained • Access to animal resources, rumen microbes and feed resources is not constrained 	<ul style="list-style-type: none"> • Budget allocated to project • Agreements with at least five country governments and NARS for the execution of multi-institutional research projects signed and put in operation by 2001 • Agreements for the characterisation, collection and transport (if required) of feed resources, rumen microbes and animals signed and adhered to with/by at least three countries by 2002

Project 3. Livestock health

Objective

Animal diseases are a principal constraint to smallholder livestock farmers in the developing world, reducing livestock productivity and restricting investment and intensification. This project focuses on removing these constraints, working on priority diseases identified through quantitative epidemiology and economic impact assessment. The project will improve and develop animal health technologies such as vaccines and diagnostics using immunological, genomic and bio-informatics tools, develop decision support systems and design integrated control strategies. Current focus is on the vector-borne diseases—theileriosis and trypanosomosis.

Outputs

- Tools for determination of comparative impact of livestock diseases on global poverty and food security (with projects 1 and 4)
- Decision support systems to improve national policies and interventions to control economically important diseases (with projects 1 and 6)
- Genome analysis and sequencing of pathogenic micro-organisms as a means of identifying candidate molecules as targets for new drugs, vaccines and diagnostics
- Development of subunit vaccines against theileriosis caused by *Theileria parva*
- Integrated control strategies for ticks and tick-borne diseases and trypanosomosis through effective use of improved vaccines, diagnostics, optimum use of drugs and epidemiological information (with project 1)
- Training of stakeholders to facilitate improved adoption of animal health technologies (with project 7)

Gains (impact)

The research will contribute to improved productivity of livestock in the smallholder farming sector through efficient delivery of existing and new health technologies and decreased dependence on toxic chemicals and drugs to control diseases and hence reduce environmental damage.

Duration—Five years

Milestones

- 2002 Improved global disease information system available. Bio-informatics capacity to exploit genome sequence data established. Evaluation of an anti-disease antigen congoxin for trypanosomes completed
- 2003 Commercial partners for delivery of TBD diagnostics and improved vaccine for ECF identified
- 2004 Factors inducing drug resistance in trypanosomes identified, PCR–ELISA deployed, drug resistance markers for trypanosome and decision support system for integrated control of trypanosomosis developed

Users—NARS, NGOs, FAO, private sector

Collaborators

NARS partners: LIDIVET, Bolivia; EMBRAPA, Brazil; University of Ouagadougou, Burkina Faso; MoA, Chile; Anader, CNRA, Côte d'Ivoire; BCT, RD Congo; ITC, The Gambia; Egerton University, KARI, Kenyatta University, KETRI, OAU/IBAR, University of Nairobi, Veterinary Department, Kenya; CVLM, Mali; MoA, The Philippines; MoA, University of San Marcos, Peru; Cheik Anta Diop University, Senegal; Onderstepoort Veterinary Institute, University of Pretoria, South Africa; ADRI, Sokoine University of Agriculture, Veterinary Department, Tanzania; DLD, Thailand; AHRC, Makerere University, NARO, Uganda; MoA, Uruguay; Department of Veterinary and Tsetse Control Services, Zambia; CVL, USAID/SADC Heartwater Project, Zimbabwe

ARI partners: ACIAR, Animal Research Institute, QDPI, Australia; Catholic University of Louvain, FUB, ITM, University of Namur, Belgium; CIRAD-EMVT, University of Tours, France; Free University of Berlin, Institute of Microbiology, Germany; ID-Lelystad, University of Utrecht, Wageningen Agricultural University, The Netherlands; NIAH, University of Hokkaido, University of Obihiro, Japan; Swiss Tropical Institute, Switzerland; AgResearch, New Zealand; FAO, Rome; Regional Coordination Unit of OIE, Thailand; FAO/IAEA, University of Vienna, Austria; University of Guelph, University of Victoria, Canada; IAH, LID, Moredun Research Institute, Roslin Institute, Universities of Cambridge, Edinburgh, Glasgow, London, Oxford, Strathclyde, Warwick and York, UK; Universities of Florida, Massachusetts, TIGR, USDA–ARS, WSU, USA

CGIAR partners: ICARDA

Regional and eco-regional partners: CIRDES, Burkina Faso

Private sector partners: Seppic, France; Pecura-Quiagen, Germany; Chiron, USA; Intervet, The Netherlands

Outsourcing: Free University of Brussels, ITM, Belgium; TIGR, WSU, USA

Cost—US\$ 9 million in 2002, increasing to US\$ 9.3 million in 2004

System linkages—Sustainable production, policy and enhancing NARS

Livestock health

Hierarchy of activities/objectives	Indicators	Assumptions	Indicators for assumptions
<p>Goal Poverty, hunger and environmental degradation are reduced through use of improved livestock health technologies that enhance productivity and sustainability of agricultural systems in developing countries</p>	<ul style="list-style-type: none"> • Reduced poverty and environmental degradation with increased food security in agricultural systems with livestock components in the developing world 		
<p>Intermediate goal Because of improved health through integrated disease control strategies:</p> <ul style="list-style-type: none"> • Livelihoods of resource-poor livestock keepers are sustainably improved • Animal products are more affordable and accessible for the poor • Natural resources are conserved in developing countries 	<ul style="list-style-type: none"> • Livestock productivity in target systems increased • Income derived from livestock in smallholder systems increased • Contribution of livestock to trade increased • Food security, and improved nutrition and health of poor people enhanced • Livestock practices used by smallholders in marginal areas are sustainable • Land and water resources involving livestock more effectively used 		
<p>Purpose Integrated disease control methodologies developed through partnership with NARS, private sector and other stakeholders to improve livestock productivity</p>	<ul style="list-style-type: none"> • Morbidity and mortality due to epidemic diseases reduced by 10% in livestock by 2007 in target countries • 10% reduction in the use of toxic acaricides and drugs through use of integrated disease control strategies for vector-borne diseases by 2007 • Milk and meat production increased between 2% and 5%, by 2010, due to improved control of diseases of cattle 	<p>Assumptions for achievement of intermediate goal</p> <ul style="list-style-type: none"> • Livestock diseases are still a priority in the smallholder sector and alternative control methods are not developed • Ticks, tick-borne diseases and trypanosomosis continue to be a major constraint to improved productivity in smallholder livestock systems in Africa 	<ul style="list-style-type: none"> • Decision support systems, vaccines and diagnostics are in demand for control of diseases in target countries • Commercial companies are active partners in production and delivery of improved disease control tools • Government policies support the livestock sector in all regions

Outputs	Indicators	Assumptions for achievement of purpose	Indicators for assumptions
<ul style="list-style-type: none"> • Determination of comparative impact of livestock diseases on global poverty and food security to improve research prioritisation at ILRI • Improvement of delivery and adoption of available technologies such as vaccines, chemotherapeutic agents for control and prevention of livestock diseases • Improved health and productivity of livestock through effective prevention and control of ticks and tick-borne diseases through rational and integrated deployment of health technologies such as improved vaccines, diagnostics and decision support systems • Improved health and productivity of livestock through effective prevention and control of trypanosomosis and its vectors through rational and integrated deployment of health technologies such as improved vaccines, diagnostics, chemotherapy and decision support systems • Training of NARS and other stakeholders to facilitate collaboration and improved adoption of ILRI developed animal health technologies 	<ul style="list-style-type: none"> • Improved animal health information systems developed by 2003 • ILRI's investment and research focused on priority diseases identified as constraints to livestock development in Africa and Asia by 2003 • Production systems specific decision aid tools for integrated disease control strategies developed by 2007 • Strategies for integrated control of TBD, incorporating appropriate combination of technologies and methodologies such as vaccines, diagnostics and decision support systems, developed for smallholder dairy in East Africa and for grassland systems of South Africa developed by 2003 • Strategies for integrated control of trypanosomosis, incorporating appropriate combination of technologies and methodologies such as drugs, diagnostics and decision support systems, developed in mixed systems in Lake Victoria Basin by 2003 • Serological and immunological reagents available for identification of protective antigens by 2003 	<ul style="list-style-type: none"> • Private sector and other agencies will be willing to participate in delivery of improved disease control methods • Enabling environment within the NARS for adoption and utilisation of ILRI's outputs 	<ul style="list-style-type: none"> • Increased evidence of privatisation of veterinary services and products • Expansion of national extension services through NGOs and private sector • Improved veterinary services

Activities	Milestones	Preconditions for implementation of activities	Indicators
<ul style="list-style-type: none"> • Collect data on livestock diseases through existing regional and international networks • Validate data with secondary information • Perform <i>ex ante</i> impact assessment and identify priority diseases for target production systems • Identify key constraints to effective delivery of existing animal health technologies such as live vaccines against ECF and chemotherapeutic agents against trypanosomosis • Modify existing products and disease control methodologies to make them user-friendly for improved adoption in target production systems • Train and assist NARS and other stakeholders in the use of improved disease control technologies • Backstop regional disease control programmes • Define epidemiology of tick-borne diseases in target production systems through field and experimental data generated using improved diagnostic and characterisation tools • Develop infection dynamics models for major tick-borne pathogens • Identify additional candidate protective antigens of <i>T. parva</i> and evaluate these in cattle at ILRI • Introduce integrated TBD control strategies in target production systems • Develop new diagnostics for detection of trypanosome infections and identify drug resistant markers • Complete epidemiological studies on drug resistance in trypanosomes • Develop methodologies for optimum use of trypanocidal drugs for improved control of trypanosomosis • Complete evaluation of congopain as an anti-disease vaccine against trypanosomosis • Train staff from Africa, Asia and South America in modern epidemiological methods, diagnostics tests and the use of animal health technologies for control of diseases 	<ul style="list-style-type: none"> • ILRI database on livestock diseases in developing countries available by 2003 • <i>Ex ante</i> impact assessment of important endemic and epidemic diseases completed and priority diseases of economic importance identified by 2003; ILRI's target diseases modified following priority setting by 2003 • Constraints analysis on poor adoption of vaccines against tick-borne diseases and trypanocidals completed by 2002 • Quality of ECF vaccine improved by 2003 • NARS staff trained to deploy improved vaccine by 2003 • Donor support for the Biological Services Unit provided for backstopping vector-borne diseases • Infection dynamic models for theileriosis, babesiosis, anaplasmosis and cowdriosis developed and validated by 2003 • Additional candidate genes identified for <i>T. parva</i> by 2002 • Integrated disease control strategy based on epidemiological information and infection dynamics models developed for evaluation on farm by 2003 • PCR-ELISAs, antigens for antibody detection tests and molecular markers for trypanosomes evaluated in the field by 2003 • Factors and field conditions that induce drug resistance in trypanosomes identified by 2003 • Decision support system for integrated control of trypanosomosis available by 2003 • Two courses held in epidemiology and diagnostics by 2002 	<ul style="list-style-type: none"> • Livestock diseases are still a priority in smallholder sector and alternative control methods are not developed • Ticks, tick-borne diseases and trypanosomosis continue to be a major constraint to improved productivity in smallholder livestock systems in Africa • Demand for new animal health technologies exists for control of livestock diseases • Resources such as funding, technical and scientific staff and institutional infrastructure are available 	<ul style="list-style-type: none"> • Diseases continue to cause increased morbidity and mortality in livestock • Sale of acaricides and drugs increase in the livestock sector to control vector-borne diseases • The use of improved, highly productive breeds of cattle in smallholder sector continues to decline • Reports of development of acaricide resistance and drug resistant trypanosome populations are on the rise • Newer and more expensive chemicals for vector control continue to be produced by pharmaceutical companies

Project 4. Livestock genetics and genomics

Objective

Animal genetic resources have evolved in diverse environments and carry unique combinations of genes that define productive and adaptive capabilities, which can contribute to sustainable agriculture in low-input production systems. About one-third of the 4000 breeds of livestock world-wide risk extinction. Disease is a major factor limiting livestock productivity in large areas of the tropics and subtropics. The objectives of this project are to document the characteristics of and genetic diversity among indigenous livestock breeds of developing countries, to identify genes controlling tolerance of trypanosomes and resistance to helminths, to design breeding programmes to improve disease resistance and overall productivity in low-input environments, and foster conservation of indigenous breeds.

Outputs

- Databases of domestic animal genetic diversity in Africa and Asia (with projects 1 and 7)
- Tools for characterising and valuing, and setting priorities for conserving and utilising animal genetic resources at local, regional and global levels (with projects 1, 6 and 7)
- Identify and characterise genetic loci controlling trypanosomosis tolerance in cattle and helminthosis resistance in sheep as a route to genetic improvement in livestock (with projects 1 and 3)
- Strategies for simultaneous improvement of disease resistance/tolerance and productivity in cattle and sheep and for conservation and sustainable use of animal genetic resources (with projects 1, 6 and 7)

Gains (impact)

Characterisation of animal genetic resources promotes continuing use and conservation of indigenous livestock, which are usually more productive than exotics under low levels of input, thus increasing farmers' incomes and food security. Use of disease resistant livestock will contribute to increased productivity, reduced chemical and drug usage and improved environmental health where disease presently constrains production.

Duration—Five years

Milestones

- 2002 Animal genetic resources information database for SSA expanded; breed survey instruments released to NARS in SSA; genetic relationships available for African sheep and goat; valuation case studies completed; broad and fine-scale helminthosis tolerance QTL mapping completed in sheep and mice, respectively; candidate genes for cattle trypanosome tolerance identified; gene expression studies of trypanosome and helminth tolerance initiated; analyses of within breed genetic variation in trypanotolerance published
- 2003 Global diversity of camels and several African regional livestock surveys completed and preliminary Asian survey available; preliminary designs completed for breeding strategies in sheep and cattle; first generation tools for functional genomic and SNP studies completed for cattle and sheep and trials initiated; gene for trypanosomosis tolerance identified in mice
- 2004 Characterisation of African chicken breeds and first Asian diversity surveys completed; second generation livestock genetic resource database released; global valuation tools developed and evaluated; preliminary results of field trial of cattle trypanotolerance QTL available; strong functional and positional candidates of mouse helminth tolerance QTL identified

Users—National, parastatal and private breeding programmes; individual livestock producers

Collaborators

NARS partners: more than 30 NARS in SSA, Asia and LAC

ARI partners: BGTL, Ghent University, Liege University, Belgium; University of Guelph, Canada; Trinity College, Dublin, Eire; CIRAD, France; FAARP; BNITM Hamburg, FBN-Dummerstorf, Germany; NIAH, Shirakawa Institute for Animal Genetics, Japan; FAO, Italy; Roslin Institute, University of Edinburgh, University of Liverpool, University of Nottingham, UK; ID-DLO Lelystad, Wageningen Agricultural University, The Netherlands; CSIRO Molecular Animal Genome Centre, Australia; AgResearch, New Zealand; Hebrew University, University of Haifa, Israel; National Animal Germplasm Program USDA, TAMU, USA; ETH Zurich, Switzerland

CGIAR partners: ICARDA, System-wide Genetic Resources Programme

Regional and ecoregional partners: SADC, Botswana; CIRDES, Burkina Faso; ITC, The Gambia; ASARECA, Uganda

Private sector partners: Brentec Laboratories, Compagnie J. Van Lancker

Cost—US\$ 4.0 million in 2002, increasing to US\$ 4.4 million in 2004

System linkages—Germplasm improvement, germplasm collection, sustainable production, enhancing NARS

Livestock genetics and genomics

Hierarchy of activities/objectives	Indicators	Assumptions	Indicators for assumptions
<p>Goal</p> <ul style="list-style-type: none"> • Poverty is reduced through access to animal genetic resources with enhanced productivity • Food security is improved through use of adapted livestock with high survival and good production potential • Genetic diversity of livestock is conserved 	<ul style="list-style-type: none"> • Reduced poverty and environmental degradation with increased food security in agricultural systems with livestock components in the developing world 		
<p>Intermediate goal</p> <ul style="list-style-type: none"> • Productivity is improved by ensuring that genetic resources are available to meet diverse production environments • Productivity is improved by provision of disease resistant livestock in areas where disease constrains livestock production 	<ul style="list-style-type: none"> • More than 90% of priority livestock breeds of Africa and Asia still exist in 2010 • More than 85% of priority livestock breeds of Africa and Asia remain by 2020 • There is at least one instance of increased utilisation of an existing indigenous breed or use of new crossbred animals based on one or more indigenous breeds by 2020 • Trypanosomosis tolerant cattle with improved performance are released for farmer use in at least one high trypanosome challenge area by 2015 • Helminthosis resistant sheep with improved tolerance are released for farmer use in at least one high challenge area by 2015 • Cattle and sheep production in high trypanosome and helminth challenge areas is increased by 2020 		
<p>Purpose</p> <ul style="list-style-type: none"> • NARS and other stakeholders utilise AnGR evaluation tools to set priorities for genetic conservation programmes and to identify genetic resources useful for genetic improvement programmes • NARS and other stakeholders develop breeding programmes to improve livestock productivity through improved disease tolerance and adaptation 	<ul style="list-style-type: none"> • Client groups frequently add to and extract information from the ILRI AnGR database • At least one breeding programme to improve disease resistance of sheep and cattle is initiated by 2005 	<p>Assumptions for achievement of intermediate goal</p> <ul style="list-style-type: none"> • Local cultural and political situations allow uptake of improved AnGR by farmers 	<ul style="list-style-type: none"> • At least one obvious example of uptake of improved germplasm by smallholders by 2010

Outputs	Indicators	Assumptions for achievement of purpose	Indicators for assumptions
<ul style="list-style-type: none"> • A publicly accessible database of domestic animal genetic diversity is created • Tools for characterising and valuing AnGR are provided • Genetic loci controlling trypanosomosis tolerance in cattle and helminthosis resistance in sheep identified and characterised • Understanding of the genetic basis of resistance to trypanosomosis, helminthosis and other diseases is improved and tools for field evaluation developed • Strategies for improvement of disease resistance/tolerance and productivity in cattle and sheep and for conservation and sustainable use of AnGR are provided • Expertise and capacity of staff of NARS and other strategic partners is enhanced through training received by graduate students and staff at ILRI and also through external training programs 	<ul style="list-style-type: none"> • AnGR database (DAGRIS) for cattle in Africa is expanded to other species and regions with enhanced capabilities thereafter • Methods for on-farm phenotypic characterisation of AnGR tested and released for use by 2002 • Methods for economic valuation of traits and breeds tested and released by 2002 • First set of economic values of traits and breeds available in 2003 • Fine-mapping of genes controlling helminthosis resistance in mice completed in 2002 • Broad-scale mapping of genes controlling helminthosis resistance in sheep completed in 2002 • Strong candidates for at least two of the genes controlling trypanosome tolerance in mice identified by 2002 • Strong candidates for at least two of the genes controlling trypanosomosis tolerance in cattle identified by 2002, with further candidates in 2003 and 2004 • Strategy document available detailing viable approaches to simultaneous improvement of disease resistance and productivity in cattle and sheep by 2003 • Graduate students successfully complete their studies and are employed or return to employment within NARS and other organisations • Staff of NARS and other organisations take part in ILRI training programmes and utilise new skills in their work setting 	<ul style="list-style-type: none"> • NARS and other stakeholders create policy instruments and devote resources to conservation and utilisation of AnGR • NARS and other stakeholders continue to recognise the social and economic value of genetic improvement programmes and devote appropriate resources to such programmes 	<ul style="list-style-type: none"> • Policies are created and resources are allocated by at least two countries or international organisations by 2003 • Plans for improvement programmes based on at least one indigenous breed commenced by 2003

Activities	Milestones	Preconditions for implementation of activities	Indicators
<ul style="list-style-type: none"> • Document the phenotypic characteristics and status of African and Asian priority livestock • Estimate genetic diversity and relationships among breeds using molecular genetic markers • Construct an electronically accessible database of information on animal genetic resources • Devise and field test survey instruments for collection of information on phenotypic characters and economic valuation of traits and breeds and then apply in selected countries • Identify chromosomal locations of genes controlling tolerance of trypanosomosis in cattle based on molecular marker mapping in cattle and in mice as a model • Identify the broad chromosomal locations of genes controlling resistance to helminthosis in sheep based on molecular marker mapping in sheep and in mice as a model • Refine the location of genes controlling trypanosome tolerance and helminthosis resistance in mice using molecular marker mapping of advanced intercross generations and, where possible, in cattle and sheep by comparative mapping against mouse results • Identify strong candidate genes for tolerance/resistance using mouse/human comparative maps, development of contigs in mice and comparative mapping between cattle and mice/humans • Undertake functional genomic studies of disease tolerance in cattle, sheep, mice and wildlife • Develop breeding strategies for improvement of disease resistance and productivity of cattle and sheep in low -input production systems • Experimental evaluation of genetic resistance to helminthosis and integrated control strategies for sheep and goats in South-East Asia • Education and training of students and staff of partners is undertaken by providing a world-class research environment for students and through specific training and capacity building programmes 	<ul style="list-style-type: none"> • Broad-scale characterisation of African sheep and goats available in 2002 and for Asian yaks in 2003, African chickens in 2004 • DAGRIS database expanded and first Asian data entered by 2003 • Initial field test of phenotypic and economic survey instruments is complete in 2002 and results of specific applications become available from 2003 • Broad and fine-scale mapping of helminthosis resistance genes is completed in sheep and mice, respectively, in 2002 • Strong candidates for resistance genes are identified, based on physical and functional genomic studies, by 2003 • Study of field relevance of putative genes controlling trypanosomosis tolerance is commenced in 2002 • Functional genomic studies of disease tolerance of mice, cattle and sheep, initiated in 2002 and expanded thereafter. Wildlife studies commenced in 2004 • Estimates of within-breed heritability of trypanotolerance and evaluation of diagnostics for field testing published in 2002 • Study to test tools for field evaluation of tolerance of various diseases in ruminants initiated in 2002 • Strategies for improvement of disease resistance and productivity outlined by 2003 • Ranking of goat and sheep breeds in South-East Asia for helminthosis resistance is completed in 2002 and integrated control strategies for helminthosis evaluated by 2003 • An existing capacity building project for genetic resources and genetic improvement is continued in 2002 to 2004 	<ul style="list-style-type: none"> • Sharing of information among AnGR holding countries takes place without major obstacles from sovereignty issues • Collection and movement of DNA for genotyping takes place without major sovereignty or technical barriers • The mouse genome projects deliver the first draft sequences identifying the majority of mammalian genes by 2002 	<ul style="list-style-type: none"> • Information flows from most collaborators regularly and without apparent restriction • Tissue/blood samples arrive at ILRI from most countries on a regular basis

Project 5. People, livestock and the environment

Objective

Increased demand for livestock products and population pressures place increased demands on the natural resources supporting livestock production and increase competition for land use. Such competition can lead to pollution, erosion, degradation and loss of plant and animal biodiversity, including wildlife. Competition for resources affects the land-use choices of smallholders and increases pressure to convert forested lands to pasture and crops. Trade-offs between short-term increased income and food security for poor people and long-term conservation of natural resources are not well understood, hindering development of interventions and strategies to improve livestock-related natural resource management. This project will develop technological, methodological and policy options through partnerships and alliances for use by NARS and other stakeholders to improve natural resource management in livestock systems.

Outputs

- Global assessment of livestock and environment hotspots—where ecosystems are most fragile and livestock impacts are expected to be highest (with project 1)
- Better information on ecosystems in livestock systems and the impacts of livestock on ecosystem goods and services (with projects 1 and 7)
- Development and testing of new decision support tools, management strategies and policy options to improve land-use and nutrient management in livestock systems (with projects 1, 2, 3, 4, 6 and 8)
- Capacity strengthening for researchers and policy makers in environmentally-sound livestock research and policy (with project 7)

Gains (impact)

This project will contribute to increased flow of goods and services (soil fertility, biodiversity) to resource-poor livestock keepers and promote improved environmentally-sound policy in the livestock sector and a better understanding and information on ways to use livestock to improve ecosystem services. Improved and widely accessible databases on livestock and environment issues will improve the capacity of ILRI's partners to conduct livestock and environment research.

Duration—Ten years

Milestones

- 2002 Strategic plans, global assessment, and databases available on CD-ROM and in reports; publication of impact assessments in L&E series reports
- 2003 Loss of soil fertility and biodiversity reduced in test sites; publication of impact assessments in peer-reviewed publications
- 2004 Constraints to technology adoption by smallholders identified and recommendations on sector policies made; sustainable crop-animal systems developed in six benchmark sites in South-East Asia

Users—Farmers, policy-makers and researchers

Collaborators

NARS partners: CARDI, Royal University of Agriculture, UTAF, Cambodia; Escuela Centroamericana de Ganadería, MAG, Costa Rica; CAAS, Chongqing Swine Academy, MoA, Sichuan Agricultural Bureau, Yunnan Beef Cattle and Pasture Research Center, China; MoA, S&T, Ethiopia; AARD, Central Research Institute for Animal Production, MoA, Indonesia; ACC, KARI, KETRI, KWS, Kenya; MRA, Niger; FMANR, Nigeria; CLSU, DoA, PCARRD, PhiRice, Philippines; AWF, MoAC, Tanzania; DLD-MoA, Kasetsart University, Khon Kaen University, Thailand; COCTU, Makerere University, Uganda; WWF, ZNP, Zimbabwe; IASV, MoARD, Vietnam

ARI partners: University of Queensland, Australia; ICIMOD, Nepal; NRI, Oxford University, UK; CSU, MSU, TAMU, World Bank, USA; FAO, Italy

CGIAR partners: CIAT, CIFOR, CIP, ICRAF, ICRISAT, IITA, IRRI

Regional and ecoregional partners: CIRDES, Burkina Faso

Cost—US\$ 4.6 million in 2002, increasing to US\$ 4.7 million in 2004

System linkages—Sustainable production, policy, enhancing NARS

People, livestock and the environment

Hierarchy of activities/objectives	Indicators	Assumptions	Indicators for assumptions
<p>Goal Poverty, hunger and environmental degradation are reduced through use of improved technologies, methodologies and policies for better natural resource management that enhance productivity and sustainability of agricultural systems in the developing world</p>	<ul style="list-style-type: none"> • Reduced poverty and environmental degradation with increased food security in agricultural systems with livestock components in the developing world 		
<p>Intermediate goal Livelihoods of smallholders improved through sustainable management of natural resources, including better and more integrated management of land use and nutrients in livestock systems that improves the flow of ecosystem goods and services to livestock keepers and other stakeholders</p>	<ul style="list-style-type: none"> • Soil fertility on farms of livestock-keepers increased • Loss of indigenous biodiversity in target livestock systems reduced • Variability of the flow of natural resources to livestock keepers decreased 		
<p>Purpose Technological, methodological and policy options developed through partnerships and alliances used by NARS and other stakeholders to improve natural resource management in livestock systems</p>	<ul style="list-style-type: none"> • Two new options to improve ecosystem goods and services developed and tested by 2003 • Two new policies that address environmental issues taken up by livestock sector policy makers by 2002, attributable at least in part to information generated through this project • Environmentally sustainable approaches to livestock production institutionalised in ILRI, NARS and NGO partner organisations • Three or four technologies tested and assessed across all six benchmark sites in South-East Asia by 2003 • Widespread adoption of 1–2 technologies by poor farming communities in rainfed areas of participating countries in South-East Asia by 2004 • Constraints to technology adoption by smallholders identified and recommendations on sector policies in South-East Asia made by 2004 • CASREN institutionalised by NARS by 2004 	<p>Assumptions for achievement of intermediate goal</p> <ul style="list-style-type: none"> • Demand exists for natural resource interventions at the farm level • Policy makers develop environmentally sound policies • NARS and other stakeholders are interested in, have the resources for and implement environmentally sustainable research approaches 	<ul style="list-style-type: none"> • Farmer demand for natural resource management interventions exists and adoption occurs • Policies are implemented which incorporate ILRI-generated information • Short- and long-term benefits of natural resource conservation are appreciated by livestock keepers, NARS and other stakeholders

Outputs	Indicators	Assumptions for achievement of purpose	Indicators for assumptions
<ul style="list-style-type: none"> • Global assessment of livestock and environment hotspots completed • Better information on ecosystem structure and function in livestock systems and the impact of interventions on the environment is available to NARS and other partners • New natural resource management technologies to improve ecosystem integrity developed and tested • Recommendations for environmentally sound management and policy in the livestock sector are available for stakeholders • Methodologies and decision support systems are available to help decision makers assess the environmental impacts of livestock interventions • Researchers and decision makers have enhanced capacity to conduct/implement environmentally-sound livestock research and policy • Impacts of selected technologies tested, assessed, and quantified in each BMS in SEA • Strategies for all year-round feeding systems defined and pursued for all BMS in SEA • 'Best performing' technologies diffused on a large scale in all BMS in SEA • Policy options for improving technology adoption and enhancing smallholder competitiveness identified and communicated to decision makers in participating SEA countries • Training in systems analysis, impact assessment, and policy analysis conducted in five SEA countries • Knowledge and information products on crop–animal systems developed, packaged, and widely distributed in SEA • Network links for technology transfer developed and fully operational in SEA • Institutionalisation of crop–animal systems research and CASREN within NARS 	<ul style="list-style-type: none"> • By late 2002, strategic plans, global assessment and databases available on CD-ROM and in reports • Publication of impact assessments in L&E series reports by 2002; in peer-reviewed publications by 2003 • Loss of soil fertility and biodiversity reduced in test sites by 2003 • Changes in livestock sector practices and policies observed • Two decision support systems available on CD-ROM, on a project website and in peer-reviewed publications by 2003 • Eight postgraduate students trained and several workshops for decision makers conducted by 2003 • Sixty researchers from South-East Asia trained by 2004 • Bibliographic and other databases, new information products and training resources on crop–animal systems research in South-East Asia distributed globally in electronic and traditional formats, and also posted on the ILRI website by 2004 • CASREN institutionalised by NARS by 2004 	<ul style="list-style-type: none"> • Technologies, management strategies and policies are useful to stakeholders • Institutional commitment to the diffusion of identified technologies • Databases and models provide information needed by stakeholders • Participating countries are committed to information exchange and technology transfer 	<ul style="list-style-type: none"> • Technologies, management strategies and policies are adopted or implemented by stakeholders • Databases, global assessments and decision support tools are used by partners

<p>Activities</p> <ul style="list-style-type: none"> • Complete hotspot analysis • Identify and implement focused research to fill gaps in understanding of system function • Develop forage germplasm and manure management options in selected areas for testing by NARS; initiate policy and technology studies on integrated nutrient management; conduct valuation of different land-use options • Identify problems and develop decision support tools with decision makers and research collaborators • Identify capacity building needs with stakeholders; conduct workshops and postgraduate studies as needed • Identify promising technologies using a participatory approach and conduct on-farm field testing of these technologies • Assess the impacts of these technologies in terms of animal productivity, costs, benefits, and environmental aspects • Diffuse 'best performing' technologies on a large scale • Identify the factors that promote and/or constrain the adoption by smallholders of improved technologies • Assess the effects of prevailing sector policies on the competitiveness of the smallholders, particularly with regard to increasing their participation in production and marketing activities • Identify policy options that will improve technology adoption and enhance smallholder competitiveness and participation in animal production and marketing • Organise and conduct training courses on systems research, impact assessment, and policy analysis • Develop highly interactive knowledge and information products to support the research activities • Package information products in suitable forms and distribute widely across the region • Develop network links for technology transfer • Organise and conduct one project planning, two review workshops, and one final symposium to present research results and provide a forum for discussion with decision and policy makers 	<p>Milestones</p> <ul style="list-style-type: none"> • Final strategy, hotspot analysis and spatial databases available by mid-2002 • Reports available and publications submitted by mid-2003 • Germplasm collected or developed for two sites by late 2002, management strategies tested in two sites in SSA by late 2003 • Landmark conceptual paper published on integrated nutrient management by 2003 • Valuation of different land-use options completed by late 2002 for two sites • Strategies and policy recommendations complete for two sub-projects by 2003 • Two decision support tools available on CD-ROM by 2003 • Three workshops conducted and eight postgraduate students trained by late 2003 	<p>Preconditions for implementation of activities</p> <ul style="list-style-type: none"> • Adequate resources continue to be available for activities • Crop–animal systems research is widely recognised and given high priority by decision makers • GIS and decision support tools continue to become more powerful and accessible to more users • Decision makers are interested and able to modify policies and use decision support systems/models 	<p>Indicators</p> <ul style="list-style-type: none"> • Funding increases over time in this research area • Increasing number of stakeholders request and use databases and decision support tools • Requests for decision support tools increase; strategies and policies are implemented that reflect, in part, recommendations developed by this project
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Project 6. Livestock policy analysis

Objective

Disabling economic policies in the developing regions often constrain smallholder access to input and output markets, new technologies and thus reduce returns to investment in livestock systems, and hinder the sustainable management of natural resources. Distortions in capital markets promote inefficient economies of scale while poor infrastructure and distortions in marketing of livestock products prevent smallholders from adopting new technologies and competing. Inadequate property rights, marketing and pricing policies encourage overgrazing. Information is needed on how policies, institutions and farm level factors interact to enhance technology adoption, promote smallholder participation in markets, and reduce negative environmental effects of livestock production. The objectives of this project are to provide information on the impact of government policies affecting the livestock sector.

Outputs

- Policy options and strategies to enhance technology adoption and delivery pathways (with project 1)
- Policy and institutional reform options to promote smallholder participation in input and output markets (with project 1)
- Policy, institutional and management options to reduce negative environmental effects of livestock production (with project 5)
- Methods, models and databases available to policy researchers and analysts in developing countries (with project 7)
- Enhanced NARS capacity in policy analysis

Gains (impact)

This project will contribute to increased productivity and incomes for smallholder farmers through increased technology adoption, access to input and markets and better management of the natural resource base by smallholders. Consumers will benefit from lower or stabilised prices. The project will also contribute to development and transfer of analytical tools to policy researchers and analysts in developing countries.

Duration—Five years

Milestones

- 2002 Source of inefficiency in product and factor markets identified and disseminated. Knowledge of factors affecting access to markets by smallholders identified and disseminated
- 2003 Review and evaluation of effects of existing policies on intensification, resource degradation and technology adoption completed
- 2004 Inventory of technical, socio-economic and policy constraints to marketing and regional trade in livestock completed

Users—Policy makers, policy researchers and analysts in the developing countries, NGOs and donor agencies

Collaborators

NARS partners: Addis Ababa University, EARO, Mekelle University, Oromiya Agricultural Development Bureau, Tigray Bureau of Agriculture, Ethiopia; CIRES, Côte d'Ivoire; Makerere University, NARO, Uganda; Ministries of Agriculture and Animal Resources in Burkina Faso, Côte d'Ivoire, Ethiopia, Ghana, Mali, Niger, Nigeria, Bangladesh and the Philippines; Bangabandhu Sheikh Mujibur Rahman Agricultural University, Department of Livestock Services, Bangladesh; PSB/GTZ, University of Ouagadougou, Burkina Faso; ARI, UST, Ghana; SUA, Tanzania; IPAR, KARI, KETRI, University of Nairobi, Kenya; OMBV, Mali; NDDB, India

ARI partners: Cornell University, Purdue University, UC Davis, Utah State University, USA; Georg-August University, Germany; Agricultural University of Norway, Norway; CIRAD-EMVT, National Veterinary School of Lyon, France; University of Manitoba, Canada; LEI, Wageningen Agricultural University, The Netherlands

CGIAR partners: IFPRI, SLP; joint staff appointment with IFPRI

Regional and ecoregional partners: ASARECA, Uganda; CILSS, Burkina Faso; CORAF, Senegal; SEARCA, Philippines

Cost—US\$ 2.2 million in 2002, increasing to US\$ 2.4 million in 2004

System linkages—Policy

Livestock policy analysis

Hierarchy of activities/objectives	Indicators	Assumptions	Indicators for assumptions
<p>Goal Poverty, hunger and environmental degradation is reduced through use of information on the impact and consequences of improved policies that enhance productivity and sustainability of agricultural systems in developing countries</p>	<ul style="list-style-type: none"> • Increased adoption of livestock technologies • Increased incomes for smallholders • Better nutrition and health for producers and consumers • Reduced degradation of the natural resource base 		
<p>Intermediate goal Increased capacity for policy analysis in developing countries leading to elaboration of appropriate policy and institutional options to improve livestock systems productivity and sustainable use of natural resources</p>	<ul style="list-style-type: none"> • Increased productivity, improved NRM achieved through adoption of key policies • Policy analysis units established in relevant government departments 		
<p>Purpose Policy makers use information provided to reduce and/or eliminate policy and institutional constraints to improved smallholder access to input and output markets and increased return to investment in livestock systems</p>	<ul style="list-style-type: none"> • Information provided to policy makers on various options to reduce policy and institutional distortions affecting livestock development 	<p>Assumptions for achievements of intermediate goal</p> <ul style="list-style-type: none"> • Policy research results are disseminated effectively • Institutional frameworks to facilitate adoption of policy recommendations are available • Policy makers have access to databases, models, policy documents and reports 	<ul style="list-style-type: none"> • Various reports including policy briefs, working papers are distributed • Policy conferences and policy dialogues organised • Models are well documented and published in user-friendly forms
<p>Outputs</p> <ul style="list-style-type: none"> • Increased knowledge on policy options and strategies to enhance technology adoption and productivity of livestock production systems • Policy and institutional reform options to promote smallholder participation in input and output markets • Policy, institutional and management options to reduce negative environmental effects of livestock production • Methods, models and databases are made available to policy researchers and analysts in the developing countries • NARS capacity in policy analysis enhanced 	<ul style="list-style-type: none"> • Policy options to improve smallholder technology uptake identified by 2003 • Policy options to improve smallholder access to markets identified by 2003 • Policy and institutional changes needed to reduce negative environmental effects identified by 2003 • Methods, models and tools tested by 2003 	<p>Assumption for achievement of purpose</p> <ul style="list-style-type: none"> • Strong partnerships with NARS and policy makers • Strong partnership with IFPRI is maintained • Data on technological options are available from other ILRI programmes and elsewhere 	<ul style="list-style-type: none"> • Memoranda of understanding with NARS • Memoranda of understanding with IFPRI • Publications and reports from other ILRI programmes

Activities	Milestones	Preconditions for implementation of activities	Indicators
<ul style="list-style-type: none"> • Analyse technology adoption patterns and processes to identify policy related constraints • Analyse policy and institutional factors affecting sustainable management of lands and livestock wastes • Identify economic incentives and constraints to smallholder participation in market-oriented livestock production • Analyse structure, function and efficiency of input/output markets serving smallholders • Assess livestock policy options for improvement of livestock trade • Provide training, capacity strengthening and databases in analysis of policies affecting livestock production, marketing and trade and the environment 	<ul style="list-style-type: none"> • Inventory of technical, socio-economic and policy constraints to technologies not adopted completed by 2003 • Review and evaluation of existing policies and effects on resource degradation completed by 2002 • Secondary information on customary and formal institutions, property rights collected by 2002 • Farm and community surveys on intensification and sustainability of production systems completed by 2002 	<ul style="list-style-type: none"> • Adequate human resources are available in NARS • Adequate funding and staffing for policy research are available • Other programme areas provide support for livestock policy analysis • Effective collaboration with IFPRI and other partners continues • Access to study sites is not constrained • Countries with relevant problems are willing to participate in project 	<ul style="list-style-type: none"> • Staff numbers and composition by discipline • Level of budget • Number of joint activities with other ILRI programmes • Memoranda of understanding with IFPRI • Memoranda of understanding with NARS and partners

Project 7. Strengthening partnerships for livestock research

Objective

The capacity for livestock research is generally weak in NARS, even in those with relatively strong crop research capacity, owing to shortage of trained livestock research scientists, funding shortfalls, isolation from sources of information and limited opportunities for collaborative research. The success of livestock research depends on strong and self-sustaining NARS with expertise in crop–livestock systems research and development, and effective collaboration. The objectives of this project are to strengthen the capacity of national partners for livestock research through training, information services, including Internet-based livestock information systems and collaborative research networks.

Outputs

- Increased research capacity and increased quality and sustainability of education and training for animal agriculture through training of trainers, networking and access to information systems and products (with projects 1, 2, 3, 4, 5, 6 and 8)
- Effective distribution and delivery of information, including Internet-based information systems to NARS, NGOs and farmers (with projects 1, 2, 3, 4, 5, 6 and 8)

Gains (impact)

NARS capacity for research on animal agriculture will be strengthened. More effective linkages will be established among NARS, and partnerships between NARS and ILRI and other crop-based centres will be strengthened. NARS ability to build and sustain their own research capacity will have been enhanced.

Duration—Five years

Milestones

- 2002 Training resources on animal genetic resources and crop–livestock systems available to NARS. Training collaboration with US land grant colleges and SSA universities established. First phase of virtual SLP in use; second phase under development. ASARECA network fully active and implementing new projects; CORAF and SADC network activities starting
- 2003 Training resources for biometrics and policy/NRM issues developed. New systems for the management of ILRI knowledge and delivery to users in place
- 2004 Over 150 NARS scientists world-wide trained; technology transfer and extra funds for NARS research leveraged by networks; at least 10 information products released including Internet-based information systems available to global users: training resources on impact assessment, animal nutrition and information systems (with FAO) available for use by NARS

Users—NGOs, NARS, FAO, CABI, other CGIAR centres and ILRI research programmes

Collaborators

NARS partners: Developing country universities, information services, and libraries and livestock research institutes; NGOs

ARI partners: Developed country universities; CABI, UK; FAO, Italy; ICIPE, Kenya; SLU, Sweden

CGIAR partners: CIAT, CIMMYT, CIP, ICARDA, ICRAF, ICRISAT, IFPRI, IITA, INTG, IPGRI, IRRI, ISNAR, SLP, WARDA

Regional and ecoregional partners: ITC, CIRDES, ASARECA; SACCAR; CORAF

Cost—US\$ 3 million in 2002, increasing to US\$ 3.2 million in 2004

System linkages—Enhancing NARS

Strengthening partnerships for livestock research

Hierarchy of activities/objectives	Indicators	Assumptions	Indicators for assumptions
<p>Goal To improve the welfare of people in developing countries through innovative collaborative research, training and information exchange that promotes sustainable increases in the productivity and sustainability of agricultural systems</p>	<ul style="list-style-type: none"> • Increase in the contribution of livestock to national GDP • Increase in household incomes and food security • Reduction in imports of livestock and livestock products 		
<p>Intermediate goal The new and strengthened capacity created within NARS for R&D is used to contribute towards</p> <ul style="list-style-type: none"> • Sustainable improvement in livelihoods of resource-poor livestock keepers • More affordable and accessible animal products for the poor • Better conservation of natural resources in developing countries 	<ul style="list-style-type: none"> • Livestock productivity in target systems increased • Income derived from livestock in smallholder systems increased • Contribution of livestock to trade increased • Food security, and improved nutrition and health of poor people enhanced • Livestock practices used by smallholders in marginal areas are sustainable • Land and water resources involving livestock more effectively used 		
<p>Purpose Enhanced R&D capacity of NARS results in ability to conduct novel research and to adapt and adopt existing research products thereby contributing to increased livestock productivity of smallholder systems.</p>	<ul style="list-style-type: none"> • The number of trained technical and scientific staff actively engaged in livestock research and development is increased by 5–10% in participating NARS by 2002 • The number of joint proposals and funding success rate for collaborative research increased by 5% by 2002 	<p>Assumptions for the achievement of intermediate goal</p> <ul style="list-style-type: none"> • Livestock R&D remains a priority at regional and international levels • Extension mechanisms are in place which allow adoption and increased research productivity resulting in increased output at farm level • Partners are committed to and financially support collaboration 	<ul style="list-style-type: none"> • National funds allocated to livestock R&D maintained or increased • Number of extension staff and activities increase
<p>Outputs</p> <ul style="list-style-type: none"> • Information/knowledge systems and products are available and information supporting livestock technologies available and disseminated • Training resources are available • Strong linkages established between ILRI and stakeholders • NARS capacity to meet regional priorities for livestock R&D strengthened through collaborative research, targeted training and information exchange 	<ul style="list-style-type: none"> • The number of employees in NARS trained either at ILRI or as a result of ILRI's training resources or by devolution of training exceed 500 in the participating regions by 2003 • More demand driven science-based livestock production technologies and information used by farmers and extension services by 2003 • Adapted and adopted technologies result in a 10% increase in R&D activities by 2003 • Number of knowledge and information products increased by 5%, and use of ILRI web-based information systems and resources increased by 5% by 2003 	<p>Assumptions for the achievement of purpose</p> <ul style="list-style-type: none"> • NARS have the resources to retain and use better trained and informed staff • Publications contain important and transferable information • Networking results in genuine collaboration • Networking addresses the real needs and constraints of the smallholder production systems 	<ul style="list-style-type: none"> • Staff benefits increased in NARS • Information products in use • Increased number of collaborative products

<p>Activities</p> <p>The project will work in collaboration with the other ILRI projects and external partners to:</p> <ul style="list-style-type: none"> • Conduct needs assessment for development and dissemination of information products • Interact with ILRI research to produce and disseminate ILRI information and knowledge • Develop information systems to promote technology transfer and exchange • Provide targeted individual and group training driven by ILRI research which meets NARS needs and supports technology transfer • Conduct impact assessment of past training activities and future needs • Host workshops/seminars to promote exchange of information and knowledge, particularly for South-South exchange • Develop training resources to strengthen NARS research and education • Contribute to the development and implementation of an integrated programme for sub-Saharan Africa (African Capacity Building Initiative) • Undertake joint planning and priority setting with partners for collaborative research activities and training • Strengthen linkages between networks and ILRI research for effective technology development and exchange • Facilitate appropriate linkages and alliances for technology transfer 	<p>Milestones</p> <ul style="list-style-type: none"> • Information systems and services provided to both internal and external users • Two courses held in epidemiology and diagnostics by the end of 2002 • Eighty ILRI publications produced on paper and electronically and distributed by 2003 • Five hundred NARS staff trained by 2003 through group and individual technical training and graduate programmes • Ten training resources developed and delivered by end of 2003 • Ten network research planning and review meetings held by 2003 • Twenty seven issues of networks' newsletters produced by 2003 • At least six regional projects and at least 30 operational research projects completed by 2003 in sub-Saharan Africa • Three regional scientific conferences held and their proceedings published by 2003 	<p>Preconditions for the implementation of activities</p> <ul style="list-style-type: none"> • Products of ILRI's SPLR programme (training, training materials, information, and network facilitation) continue to be requested by NARS • Repositories for information exist and are accessible to both ILRI and NARS staff • Funding is available to implement the programmes • All collaborators including farmers remain committed 	
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Project 8. System-wide Livestock Programme

Objective

The System-wide Livestock Programme is a CGIAR research initiative to improve livestock feed resources, natural resource management and related policies for crop–livestock agriculture. The SLP promotes synergies and leverages resources among partners for coherent and integrated livestock related research. The Programme works through partner centres, other system-wide programmes and ecoregional consortia consisting of national agricultural research systems of developing countries, and advanced research institutes of developed countries. Through these partnerships the System-wide Livestock Programme seeks to enhance productivity and sustainability of crop–livestock agriculture through improved feed and natural resource management technology and policy options.

Outputs

- Improved supply, quality and quantity of livestock feeds through use of forage legumes, fodder shrubs and crop residues (with projects 2 and 4)
- Strategies and technologies for integrated food/feed production systems developed (with projects 1, 2 and 5)
- Technology and policy options for improving the competitiveness of smallholder crop–livestock agriculture (with projects 1, 2 and 6)
- Virtual networks for improving the effectiveness and efficiency of the research process among geographically dispersed partners (with project 7)
- Models for constraint analysis and delivery of technologies in smallholder crop–livestock systems developed (with projects 1, 5 and 7)

Gains (impact)

This research will contribute to sustainable increases in productivity of target production systems within the ecoregions, leading to increased food security and reduction of poverty. Better use of feed resources and reduced competition for nutrients (for livestock and crops) in smallholder systems will also contribute to improved natural resource management and reduced environmental degradation.

Duration—Five years

Milestones

- 2002 *Ex ante* and *ex post* impact assessments of feed technologies for improving selected food/feed smallholder systems; case studies of strategies and policy options for improving competitiveness of smallholder crop–livestock farmers
- 2003 Case studies on policy interventions for sustainable crop–livestock integration among smallholders and first phase of virtual SLP implemented; crop–livestock model for managing natural resources in smallholder systems
- 2004 Selected food crops with improved feed quality selected and being tested with farmers

Users—Farmers, NGOs and NARS

Collaborators

NARS partners: Members of CIAT-led consortium for the humid and subhumid tropics; the ICARDA-led consortium for the subtropics with winter rainfall; the ICRAF-led consortium for the African Highlands; the Desert Margin Programme led by ICRISAT; the Ecoregional Programme for the Humid and Subhumid Tropics led by IITA; the Global Mountain Forum led by CIP; the Rice–Wheat Consortium led by CIMMYT/IRRI

CGIAR partners: CIAT, CIMMYT, CIP, ICARDA, ICRAF, ICRISAT, IFPRI, IITA, IRRI

Cost—US\$ 2 million per year is required to support this project

System linkages—Germplasm improvement, sustainable production, policy and enhancing NARS

System-wide Livestock Programme

Hierarchy of activities/objectives	Indicators	Assumptions	Indicators for assumptions
Goal Poverty, hunger and environmental degradation are reduced through use of improved technologies and livestock that enhance productivity and sustainability of agricultural systems in the developing world	<ul style="list-style-type: none"> Reduced poverty and environmental degradation with increased food security in agricultural systems with livestock components in the developing world 		
Intermediate goal <ul style="list-style-type: none"> Livelihoods of resource-poor crop–livestock producers sustainably improved Natural resources are conserved in smallholder crop–livestock systems in developing countries 	<ul style="list-style-type: none"> Productivity of crop–livestock systems increased 		
Purpose Through partnerships with other CGIAR centres and ecoregional programmes, feed and NRM technology and policy options developed to improve productivity of crop–livestock systems and conserve natural resources	<ul style="list-style-type: none"> Products of SLP research being implemented by NARS and other stakeholders 	Assumptions for achievement of intermediate goal <ul style="list-style-type: none"> NARS transfer options and technologies to direct beneficiaries 	<ul style="list-style-type: none"> SLP technologies are in use at the farm level in target areas
Outputs <ul style="list-style-type: none"> A virtual network for improving the effectiveness and efficiency of a global research programme Strategies and technologies for integrated food/feed production systems developed Models for constraint analysis and technology targeting developed Case studies on implications for increasing demand for livestock feeds on food security and food/feed markets Strategies and technologies for improved natural resource management developed 	<ul style="list-style-type: none"> QTLs for feed quality identified (sorghum, millet) and elite lines of food/feed crops based (cowpea, groundnuts, maize) Herbaceous legumes (five) for multiple uses identified and tested in benchmark areas and pilot sites Superior trees and shrubs (six) identified and tested in benchmark and pilot sites in WANA Productivity of smallholder mixed systems increased by 10% in benchmark areas Policy recommendations on food/feed markets being used by national programmes in South-East Asia and SSA Integrated food/feed production systems being tested in pilot sites in SSA 	Assumptions for achievement of purpose <ul style="list-style-type: none"> Developing smallholder crop–livestock systems remains an important recommendation domain for national and international research Strong ecoregional and national partnerships Research support for national programmes strengthened Donor support for the SLP continues 	<ul style="list-style-type: none"> Reports of NARS and CGIAR Budgets of NARS, SLP and ILRI
Activities <ul style="list-style-type: none"> Evaluation of germplasm of main food crops for livestock feed quality traits Evaluate agronomically elite lines of herbaceous legumes and dual-purpose crops for augmenting feed quality and supply and for contributions to soil improvement Parameterising, specifying and testing crop–livestock models for quantifying trade-offs in resource use Develop databases to test spatial crop–livestock models for natural resource management Analyse role of policies on intensification of crop–livestock production systems and smallholder participation in food/feed markets 	Milestones <ul style="list-style-type: none"> Germplasm of main food crops with superior feed quality identified by end of 2003 Elite multiple purpose legumes being tested on smallholder farms in benchmark areas by 2002 Case studies of the impact of policies on crop–livestock systems intensification published by 2002 Crop–livestock model for managing natural resources being tested in case study agro-ecological zones by 2003 Cultivars of selected food crops with improved feed quality being tested with farmers in benchmark areas 	Preconditions for implementation of activities <ul style="list-style-type: none"> ILRI's and participating centres' budgets remain stable or increase 	Indicators <ul style="list-style-type: none"> Livestock and livestock-related research remain important targets of national and international research

Annex II. ILRI partners

National institutions

Asia

Bangladesh

Bangabandhu Sheikh Mujibur Rahman Agricultural University
Department of Livestock Services
Ministry of Agriculture

Bhutan

Ministry of Agriculture

Cambodia

Cambodia Agricultural Research and Development Institute
Royal University of Agriculture
University of Tropical Agriculture Foundation

China

Chinese Academy of Agricultural Sciences
Chongqing Swine Academy
Gansu Agricultural University
Ministry of Agriculture
Sichuan Agricultural Bureau
Yunnan Beef Cattle and Pasture Research Center

India

National Dairy Development Board

Indonesia

Agency for Agricultural Research and Development
Balai Penelitian Ternak
Institut Pertanian
Ministry of Agriculture

Philippines

Central Luzon State University
Department of Agriculture
Ministry of Agriculture
Philippine Council for Agriculture, Forestry and Natural Resources Research and Development
Philippine Rice Research Institute
University of the Philippines at Los Baños

Thailand

Department for Livestock Development
Kasetsart University
Khon Kaen University

Vietnam

Institute of Agricultural Sciences of South Vietnam
Institute of Animal Sciences
Ministry of Agriculture and Rural Development

Australia/New Zealand

Australia

Animal Research Institute
Australian Centre for International Agricultural Research
Commonwealth Scientific and Industrial Research Organisation
La Trobe University
Molecular Animal Genome Centre
Queensland Department of Primary Industries
University of Adelaide
University of Queensland

New Zealand

New Zealand Pastoral Agriculture Research Institute Ltd

Europe

Austria

University of Vienna

Belgium

Blood Group Typing Laboratory of the National Cattle Breeders Association
Catholic University of Louvain
Ghent University
Institute of Tropical Medicine 'Prince Leopold'
Namur University
Université Libre de Bruxelles
Université de Liège
Vrije Universiteit Brussel

France

Centre de coopération internationale en recherche agronomique pour le Développement–
Département d'élevage et de médecine vétérinaire tropicale
Ecole nationale vétérinaire de Lyon
Université de Tours

Germany

Bernhard Nocht Institute for Tropical Medicine, Hamburg
Free University of Berlin
Georg-August Universität
Institute of Microbiology
Research Institute for the Biology of Farm Animals, Dummerstorf

Ireland

Trinity College, Dublin

The Netherlands

Agricultural Economics Research Institute
Institute for Animal Science and Health, Organization for Agricultural Research
University of Utrecht
Wageningen Agricultural University
Wageningen Institute of Animal Sciences

Norway

Agricultural University of Norway

Sweden

Swedish University of Agricultural Sciences

Switzerland

Federal Institute of Technology, Zurich
Swiss Tropical Institute

United Kingdom

Centre for Tropical Veterinary Medicine, The University of Edinburgh
Institute of Animal Health, Compton
Livestock in Development
Moredun Research Institute
Natural Resources Institute
Roslin Institute
Rowett Research Institute
University of Cambridge
University of Glasgow
University of Liverpool
University of London
University of Newcastle
University of Nottingham
University of Oxford
University of Reading
University of Strathclyde
University of Warwick
University of York

Japan

University of Hokkaido
National Institute for Animal Health, Tsukuba
Obihiro University, Hokkaido
Shirakawa Institute for Animal Genetics

Latin America

Bolivia

Veterinary Diagnosis and Investigation Laboratory, Santa Cruz

Brazil

Empresa Brasileira de Pesquisa Agropecuaria

Chile

Ministry of Agriculture

Costa Rica

Escuela Centroamericana de Ganadería
Ministerio de Agricultura y Ganadería

Mexico

Universidad Autónoma de Yucatan

Peru

Ministry of Agriculture
University of San Marcos

Uruguay

Ministry of Agriculture

Africa

Burkina Faso

Institut de l'environnement et de recherche agricole

Ministère des Ressources Animales

Programme Sahélien Burkinabe

Université de Ouagadougou

Congo (Democratic Republic of)

Bureau central de la trypanosomiase

Centre de recherche en énergie nucléaire, Université de Kinshasa

Institut national d'étude et de recherche agronomique, Université de Kinshasa

Laboratoire vétérinaire de Kinshasa

Côte d'Ivoire

Anader

Centre ivoirien de recherche économique et sociale

Centre national de recherche agronomique

Ministère de l'agriculture et des ressources animales

Ethiopia

Addis Ababa University

Alemaya University of Agriculture

Amhara National Regional Bureau of Agriculture

Ethiopian Agricultural Research Organization

Ethiopian Science and Technology Commission

Mekelle University

Ministry of Agriculture

Oromiya Agricultural Development Bureau

Tigray Bureau of Agriculture

Eritrea

Ministry of Agriculture

Ghana

Agricultural Research Institute

Ministry of Agriculture

University of Ghana

University of Science and Technology

Kenya

Department of Resource Surveys and Remote Sensing

Egerton University

Institute for Policy Analysis Research

Kenya Agricultural Research Institute

Kenya Trypanosomiasis Research Institute

Kenyatta University

Kenya Wildlife Service

University of Nairobi

Veterinary Department

Malawi

University of Malawi, Bunda College of Agriculture

Mali

Institut d'économie rurale
Laboratoire vétérinaire central
Ministère de l'agriculture
Office malien du bétail et de la viande

Niger

Ministère des ressources animales
Institut national de recherches agronomiques du Niger

Nigeria

Federal Ministry of Agriculture and Natural Resources
National Animal Production Research Institute

Senegal

Institut sénégalais de recherches agricoles
Université Cheik Anta Diop

South Africa

Agricultural Research Council
Department of Agriculture
Irene Animal Production Institute
Onderstepoort Veterinary Institute
University of Pretoria

Tanzania

Animal Disease Research Institute
Ministry of Agriculture and Co-operatives
Selian Agricultural Research Institute
Sokoine University of Agriculture
Veterinary Department

Uganda

Animal Health Research Centre
Co-ordination Office for Control of Trypanosomiasis
Makerere University
National Agricultural Research Organisation

Zambia

Department of Veterinary and Tsetse Control Services

Zimbabwe

Central Veterinary Laboratory
Department of Research and Specialist Services
University of Zimbabwe
Zimbabwe National Parks

Middle East

Israel

Hebrew University
University of Haifa

North America

Canada

University of Guelph

University of Manitoba
University of Victoria

United States of America

Colorado State University
Cornell University
Michigan State University
National Animal Germplasm Program—USDA
National Centre for Geographic Information and Analysis
Ohio State University
Purdue University
Texas A&M University
The Institute for Genomic Research
United States Department of Agriculture—Agricultural Research Service
University of California Davis
University of Florida
University of Georgia
University of Hawaii
University of Massachusetts at Amherst
University of Wisconsin—Madison
Utah State University
Washington State University

Regional organisations

Association for Strengthening Agricultural Research in Eastern and Central Africa
Centre international de recherche–développement sur l'élevage en zone subhumide
Comité permanent inter-Etats de lutte contre la sécheresse dans le Sahel
Conseil Ouest et Centre Africain pour la Recherche et le Développement Agricole
International Trypanotolerance Centre
Organization of African Unity/Inter-African Bureau of Animal Resources
Regional Centre for Graduate Study and Research and Agriculture in South East Asia
SADC Plant Genetic Resources Centre
Southern African Centre for Co-operation in Agricultural Research and Training

International organisations

Centre for Agriculture and Biosciences International
Food and Agriculture Organization of the United Nations
International Atomic Energy Agency
International Centre for Integrated Mountain Development
International Centre of Insect Physiology and Ecology
International Consortium for Agricultural Systems Applications
Office internationale des épizooties
World Bank
World Health Organization
World Resources Institute

CGIAR centres

CIAT
CIMMYT
CIP
ICARDA
ICRAF
ICRISAT
IFPRI

IITA
IPGRI
IRRI
ISNAR
WARDA

Private sector

Brentec Laboratories, Kenya
Chiron, USA
Compagnie J. Van Lancker, Kinshasa, D.R. Congo
Coopers
Intervet, The Netherlands
Pecura-Quiagen, Germany
Seppic, France

NGOs

African Conservation Centre
African Wildlife Foundation
Sasakawa-Global 2000
World Wide Fund for Nature

Annex III. List of acronyms

AARD	Agency for Agricultural Research and Development, Indonesia
ACC	African Conservation Centre, Kenya
ACIAR	Australian Centre for International Agricultural Research
ADRI	Animal Disease Research Institute, Tanzania
AgResearch	New Zealand Pastoral Agriculture Research Institute Ltd
AHRC	Animal Health Research Centre, Uganda
ANFs	Anti-nutritional factors
AnGR	Animal genetic resources
ARC	Agricultural Research Council
ARIs	Advanced research institutes
ARI	Agricultural Research Institute, Ghana
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
AWF	African Wildlife Foundation, Tanzania
BCT	Bureau central de la trypanosomiase, Democratic Republic of Congo
BGTL	Blood Group Typing Laboratory of the National Cattle Breeders Association, Belgium
BMS	Benchmark site
BNITM	Bernhard Nocht Institute for Tropical Medicine, Hamburg
BPT	Balai Penelitian Ternak, Indonesia
CABI	Center for Agriculture and Biosciences International
CAC	Central Asia and the Caucasus
CARDI	Cambodia Agricultural Research and Development Institute
CAS	Central Advisory Service of the CGIAR
CAAS	Chinese Academy of Agricultural Sciences
CASREN	Crop–animal Systems Research Network
CCER	Centre commissioned external review
CDC	Center Directors Committee
CD-ROM	Compact disc-Read only memory
CGIAR	Consultative Group on International Agricultural Research
CIAT	Centro Internacional de Agricultura Tropical (International Center for Tropical Agriculture)
CIFOR	Centre for International Forestry Research
CILSS	Comité permanent inter-Etats de lutte contre la sécheresse dans le Sahel
CIMMYT	Centro Internacional de Mejoramiento de Maiz y Trigo (International Maize and Wheat Improvement Center)
CIP	Centro Internacional de la Papa (International Potato Center)
CIRAD	Centre de coopération internationale en recherche agronomique pour le développement
CIRAD–EMVT	Centre de coopération internationale en recherche agronomique pour le développement–Département d'élevage et de médecine vétérinaire tropicale
CIRDES	Centre international de recherche-développement sur l'élevage en zone subhumide
CIRES	Centre ivoirien de recherche économique et sociale
CLSU	Central Luzon State University
CNRA	Centre national de recherche agronomique, Côte d'Ivoire
COCTU	Coordinating Office for Control of Trypanosomiasis in Uganda
CONDESAN	Consortium for the Sustainable Development of the Andean Ecoregion
CORAF	Conseil Ouest et Centre Africain pour la Recherche et le Développement Agricole
CRSP	Collaborative Research Support Program
CSIRO	Commonwealth Scientific and Industrial Research Organisation, Australia

CSU	Colorado State University
CTVM	Centre for Tropical Veterinary Medicine, UK
CVL	Central Veterinary Laboratory, Zimbabwe
CVLM	Central Veterinary Laboratory, Mali
DAGRIS	Domestic Animal Genetic Resources Information System
DLD	Department for Livestock Development, Thailand
DMP	Desert Margin Programme
DNA	Deoxyribonucleic acid
DoA	Department of Agriculture
DRSRS	Department of Resource Surveys and Remote Sensing, Kenya
DRSS	Department of Research and Specialist Services, Zimbabwe
EARO	Ethiopian Agricultural Research Organization
ECF	East Coast fever
ELISA	Enzyme-linked immunosorbent assay
EMBRAPA	Empresa Brasileira de Pesquisa Agropecuaria
EPHTA	Ecoregional Programme for the Humid and Subhumid Tropics of SSA
ETH	Federal Institute of Technology, Switzerland
FAARP	Food, Agriculture and Agro-Industry Research Programme of the European Union's concerted Action Project
FAO	Food and Agriculture Organization of the United Nations
FBN-Dummerstorf	Research Institute for the Biology of Farm Animals, Dummerstorf
FMANR	Federal Ministry of Agriculture and Natural Resources, Nigeria
FUB	Free University of Brussels
GDP	Gross domestic product
GIS	Geographic information systems
GTZ	German Agency for Technical Co-operation
HIV/AIDS	Human immuno-deficiency virus/Acquired immuno-deficiency syndrome
IAEA	International Atomic Energy Agency
IAH	Institute of Animal Health, UK
IARC	International agricultural research centre
IASV	Institute of Agricultural Sciences of South Vietnam
ICAR	Indian Council of Agricultural Research
ICARDA	International Center for Agricultural Research in the Dry Areas
ICASA	International Consortium for Agricultural Systems Applications
ICIMOD	International Centre for Integrated Mountain Development
ICIPE	International Centre of Insect Physiology and Ecology
ICRAF	International Centre for Research in Agroforestry
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
ID-DLO	Institute for Animal Science and Health, Organization for Agricultural Research, The Netherlands
ID-Lelystad	Organization for Agricultural Research, Lelystad, The Netherlands
IER	Institut d'économie rurale, Mali
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
IITA	International Institute of Tropical Agriculture
ILCA	International Livestock Centre for Africa
ILRAD	International Laboratory for Research on Animal Diseases
ILRI	International Livestock Research Institute
INERA-BF	Institut de l'environnement et de recherche agricole -Burkina Faso
INRAN	Institut national de recherches agronomiques du Niger
INTG	IARC/NARS Training Group
IP	Intellectual Property
IPAR	Institute for Policy Analysis Research, Nairobi
IPB	Institute Pertanian Bogor, Indonesia
IPGRI	International Plant Genetic Resources Institute

IPMU	Intellectual Property and Management Unit
IRRI	International Rice Research Institute
IRS	Internationally Recruited Staff
ISAAA	International Service for the Acquisition of Agri-Biotech Applications
ISNAR	International Service for National Agricultural Research
ISRA	Institut sénégalais de recherches agricoles, Senegal
ITC	International Trypanotolerance Centre
ITM	Institute of Tropical Medicine, Belgium
KARI	Kenya Agricultural Research Institute
KETRI	Kenya Trypanosomiasis Research Institute
KWS	Kenya Wildlife Service
LAC	Latin America and the Caribbean
L&E	Livestock and environment
LEI	Agricultural Economics Research Institute, The Netherlands
LID	Livestock in Development, UK
LIDIVET	Veterinary Diagnosis and Investigation Laboratory, Bolivia
MAG	Ministerio de Agricultura y Ganadería, Costa Rica
MoA	Ministry of Agriculture
MoAC	Ministry of Agriculture and Cooperatives
MoARD	Ministry of Agriculture and Rural Development
MRA	Ministère des ressources animales
MSU	Michigan State University
MTP	Medium-term plan
NAPRI	National Animal Production Research Institute, Nigeria
NARO	National Agricultural Research Organization, Uganda
NARS	National agricultural research systems
NCGIA	National Center for Geographical Information and Analysis
NDDB	National Dairy Development Board
NGO	Non-governmental organisation
NIAH	National Institute for Animal Health, Japan
NRI	Natural Resources Institute, UK
NRM	Natural Resources Management
NRS	Nationally Recruited Staff
OAU/IBAR	Organization of African Unity/Inter-African Bureau of Animal Resources
OIE	Office internationale des épizooties
OMBV	Office malien du bétail et de la viande
PCARRD	Philippine Council for Agriculture, Forestry and Natural Resources Research and Development
PCR	Polymerase chain reaction
PhiRice	Philippine Rice Research Institute
PRA	Participatory rural appraisal
PSB	Programme Sahelian Burkinabe
QDPI	Queensland Department of Primary Industry
QTL	Quantitative trait loci
R&D	Research and development
SACCAR	Southern African Centre for Co-operation in Agricultural Research and Training, Botswana
SADC	Southern African Development Community
SARI	Selian Agricultural Research Institute, Tanzania
SEA	South-East Asia
SEARCA	Regional Centre for Graduate Study and Research and Agriculture in South East Asia
SGRP	System-wide Genetic Resources Programme
SLP	System-wide Livestock Programme
SLU	Swedish University of Agricultural Sciences

SNP	Single nucleotide polymorphism
SPLR	Strengthening Partnerships for Livestock Research
SSA	Sub-Saharan Africa
S&T	Ethiopian Science and Technology Commission
SUA	Sokoine University of Agriculture, Tanzania
TAC	Technical Advisory Committee of the CGIAR
TAMU	Texas A&M University
TBD	Tick-borne diseases
TIGR	The Institute for Genomic Research, USA
UC Davis	University of California-Davis
UK	United Kingdom
USA	United States of America
USAID	United States Agency for International Development
USDA-ARS	United States Department of Agriculture-Agricultural Research Service
UST	University of Science and Technology, Ghana
UTAF	University of Tropical Agriculture Foundation, Cambodia
WANA	West Asia and North Africa
WARDA	West Africa Rice Development Association
WSU	Washington State University, USA
WWF	World Wide Fund for Nature
WWW	World Wide Web
ZNP	Zimbabwe National Parks