

THE ROCKEFELLER FOUNDATION

August 29, 1994

**To: Members of the Consultative Group on
International Agricultural Research**

**From: R.D. Havener, Consultant
The Rockefeller Foundation**

**Subject: THE 1995 PLAN OF WORK AND BUDGET FOR
THE INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE (ILRI)**

Recently you should have received a letter dated August 5, 1994 from Dr. Robert Herdt, Director of Agricultural Sciences of the Rockefeller Foundation, reporting on progress toward the establishment of the new global International Livestock Research Institute (ILRI). In that letter, Dr. Herdt provided considerable detail which I will not repeat here. Perhaps it is sufficient to report that all diplomatic and administrative arrangements appear to be in place for ILRI to be officially created as an international organization on September 21, 1994 in Berne, Switzerland. Following that event, the founding Board of Trustees of ILRI will assume the crucial next steps of recruiting a director general and negotiating a headquarters agreement. Fortunately, the Implementing Advisory Group (IAG) has assisted with a great deal of the required preliminary work in these important areas.

Enclosed you will find the 1995 Program of Work and Budget for ILRI, plus a supplement which contains a proposal for a CGIAR System-Wide Livestock Initiative to begin in the coming year.

As you know, ILRI is being asked by the System to develop a truly global livestock research program while at the same time continuing the relevant and important portions of the current work of ILCA and ILRAD. We believe the proposed 1995 Program of Work and Budget meets this challenge.

The ILRI Strategic Planning Task Force has worked closely with the management and staff of ILCA and ILRAD in preparing these documents. The resulting plans have twice been discussed with TAC. The Implementing Advisory Group has reviewed all documents carefully and has formally approved of their contents.

I would like to use this opportunity to specifically thank the management and staff of ILCA and ILRAD for their hard work and cooperation. Without these it would have been impossible for the implementing agency to present a strong global research program and budget to the Group. Because of their participation we believe we have done so. As implementing agency, we commend these documents and the proposed level of funding for your consideration and support.

We look forward to an opportunity to discuss these plans with you during the upcoming International Centers Week in Washington, D.C. In the meantime I am sure Dr. Herdt would welcome your comments or questions.

cc: CGIAR Secretariat

ILRI

**Programme Plans and Funding
Requirements for 1995**

August 1994

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International Livestock Research Institute (ILRI)

Draft Programme and Budget For 1995

Introduction

The International Livestock Research Institute will come into existence on the 1st of January 1995. It will subsume the activities of the International Laboratory for Research on Animal Diseases (ILRAD) and the International Livestock Centre for Africa (ILCA), and will pursue programmes of strategic and applied research for the improvement of livestock productivity and the integration of livestock into sustainable agricultural systems globally. To assist in the definition of the role and activities of ILRI within a new CGIAR system wide strategy for livestock research, a Strategic Planning Task Force (SPTF) under the auspices of an Implementing Advisory Group (IAG), and on behalf of the Rockefeller Foundation, Implementing Agency (IA), has developed strategic and planning documents for ILRI. Advanced drafts of a *Strategic Plan for a New CGIAR Global Livestock Research Institution* and *An Indicative Medium-Term Plan (MTP) for the International Livestock Research Institute*, have been considered by the Technical Advisory Committee (TAC) of the CGIAR at their meeting in June 1994 (TAC 64, Bouake, Cote d'Ivoire). In accordance with these plans and working under general guidelines provided by the SPTF, the management and scientific staff of ILCA and ILRAD have developed this Programme and Budget (P&B) document for the first year (1995) of the new Institute. As recognised by TAC and the IA, this draft of the P&B for ILRI is being prepared before the selection of the new Board of Trustees and Director General, and before the siting of the ILRI Headquarters has been determined. This P&B for 1995 presents a work programme in transition from the activities and operations of the two previous livestock institutes towards the wider scope of ILRI's activities envisaged in the Indicative MTP for ILRI. The document therefore not only describes the amalgamation of the priority operations of the two existing institutes but presents options and potential redistributions of capacities to allow the establishment of the anticipated workplan for ILRI in the period 1996-1998. The expected synergies gained from institutional and programme integration are highlighted in the sections relating to the new ILRI work programme for 1995. In the absence of the ILRI Board and to meet System-wide planning and budgetary requirements, the IAG has reviewed the present programme of work and budget proposed for ILRI, and the P&B is being forwarded for the consideration of TAC by the IA. Final agreement on the substance of the workplan and its implementation will be the responsibility of ILRI's new Board and Director General in 1995. This P&B has been prepared in line with TAC's recommended budget of US\$ 25.1 million for ILRI in 1995. ILRI will also have responsibility for the programming of the system-wide livestock research activities.

The Research Programme 1993/94

1993 was considered by the CGIAR as an interim budget year with the development of the System-wide budget process and alignment of all centre MTPs. However, the CGIAR has suffered a major funding crisis over the past two years. The funding reduction of the two Livestock Centres has been more severe than the average of the system. ILRAD's total income (excluding earned income) declined from \$ 13.4 million in 1991 to \$ 10.3 million in 1993, and is expected to decline further to \$ 9.3 million in 1994. ILCA's funding declined from \$ 19.9 million in 1991 to an estimated \$ 12.2 million in 1994. This represents a net reduction of more than 35% (in current dollars) for both centres combined in a four year period. Allowing for a reasonable inflation element, the reduction in real terms is approximately 41%.

As a result, activities in several research areas had to be severely curtailed, and staff numbers were reduced in both institutes. In early 1993, the contracts of twelve internationally recruited ILRAD staff members were discontinued or not renewed, eight of whom were holding senior positions. The trypanosome antigens project was discontinued and plans for work on the genome analysis of both trypanosome and theilerial organisms suspended. Requirements in these areas can only now be met by collaborative/contract research with institutes in developed donor countries dependent upon external funding. However, through salary support from generous donors (mainly Belgium, Japan and France) to some long-term visiting scientists, the Institute was able to mitigate the further impact of the severe funding difficulties. In 1994, nine senior positions are filled through such external support. ILRAD's senior staff positions reduced from 57 in 1991 to an estimated 50 SSY in 1994. Staff continuing these research programmes in ILRI are expected to reduce further in 1995 to 48. Six of these are expected to be filled with direct salary support from donors, leaving only 42 positions fully funded from core resources.

Major programmatic changes were similarly undertaken at ILCA in 1993 to balance the budget in line with the TAC approved envelope figures for the Centre in 1994. Between 1991 and 1994, ILCA senior manpower fell from 60 SSY to 54 SSY. Reductions were made in regional representation in Mali and Zimbabwe and in research staff in Ethiopia, Mali and at Kaduna in Nigeria. Research on forage genetics research was transferred to Ibadan and programmes were developed in collaboration with IITA to maintain a focus in the subhumid/humid ecoregion of Africa. Major savings have been derived since 1991 by delaying staff recruitment and implementation of major research initiatives pending special project funding (e.g. in rumen ecology, nutrient cycling and impact assessment). Financial reductions also required substantial cuts in ILCA's activities for the enhancement of the research capacity of national scientists. Recruitment of core-funded graduate and post doctoral associates was actually suspended in 1993 and recruitment is only now being resumed as present trainees complete their research. The consequence has been an approximate reduction of 25% in the number of trainees starting in a single year. There has similarly been a 30% reduction of core-funded activities in the Small Ruminant, Cattle and Feed Resources Networks involving NARS in Africa. As well as reduction in research programme activities, these reductions seriously affected ILCA's work with NARS colleagues as networks, joint projects, training opportunities and other NARS strengthening services have not developed as expected.

The programme of work developed for ILRI, in line with the indicative MTP, describes future research activities under four major headings; Animal health, Animal genetics, Integrated production systems research (which includes research on feed resources and natural resource management) and Socioeconomic and policy analysis.

Achievements in these areas which provide the starting points for future ILRI programmes are given below; activities undertaken for strengthening national capacities in livestock research are described separately.

Research Highlights 1993/94

The major research highlights in the period 1993/94 contributed by the two institutes separately or in collaboration are given below under the headings used in the Indicative MTP for ILRI and in proposing the initial programme of work for ILRI in 1995 later in this document.

ANIMAL HEALTH

Tickborne Diseases Research

ILRAD's research into the improved control of tickborne diseases of livestock has been conducted in three areas; Epidemiology, Parasite antigens and Vaccine development.

- Extensive studies in collaboration with the University of Washington State and Australian Institutes, have led to the selection of appropriate antigens of *T. parva*, *T. mutans*, *Anaplasma marginale* and *Babesia bigemina* for use in diagnostic assays for these tickborne pathogens. Within 1994, diagnostic assay procedures will be perfected and a course held to instruct representative NARS scientists from South America, Africa and Asia in the conduct of ELISA assays for the diagnosis of tickborne diseases.
- Previous work at ILRAD has identified a sporozoite antigen of *T. parva* as a potential vaccine against East Coast fever (ECF) in cattle. Differences in the alleles of the genes for the p67 antigen expressed by stocks infecting cattle and buffalo have been investigated to determine the likely efficacy of the molecule as an anti-sporozoite vaccine. A major advance has been the expression of a soluble recombinant form of the antigen in bacteria and the ability to express the antigen in eukaryotic expression systems to allow study of the secondary modification and presentation of the antigen.
- Antigen constructs are being made in bacteria and plasmids introduced into bacterial vectors appropriate for immunisation of cattle. Techniques have been developed for the identification and analysis of lymphocytes, especially CD4+, CD8+ and gamma delta T-cells, contributing to protective immune responses in young cattle, which will be the likely target population for immunisation strategies.
- The development of new reagents for class II MHC typing in conjunction with the AFRC, Roslin, UK will aid understanding of the presentation of potentially protective antigens of tickborne and other parasitic organisms

Trypanosomiasis Research

ILRAD's trypanosomiasis programme is divided into epidemiological studies of this disease complex and research into the molecular mechanisms of host resistance and parasite control integrated with experiments on genetic aspects of trypanotolerance.

- Progress with the epidemiology of trypanosomiasis has been in refinement of sampling frameworks and the establishment of projects in Africa for determining the influence of disease on production parameters.
- In collaboration with FAO/IAEA, Vienna, ILRAD's ELISA-based assays for the diagnosis of pathogenic trypanosomes are being improved with the inclusion of recombinant trypanosome protein standards. With the support of ILRAD, the IAEA is extending the use of these tests to fourteen national programmes in Africa, assisted by an extensive course for national scientists in the use of these techniques at the Nairobi Laboratory.
- To estimate drug resistance in parasite populations, ILRAD has developed (in collaboration with the University of Glasgow, UK) new assays for trypanocides in the blood of treated ruminants. Work has also characterised the process of uptake of trypanocides (especially Samorin - isometamidium chloride) by *Trypanosoma congolense*.
- In continuing research at the molecular level, two potential DNA markers for quinapyramine resistance have been identified in *T. congolense*.

Immunological and innate mechanisms expressed by ruminants which contribute to resistance to trypanosomiasis have been studied at the cellular and molecular level.

- Techniques have been derived for identifying parasite genes involved in trypanosome differentiation and division. Parasite proteins which invoke immunosuppressive effects on the host's response through macrophages have been identified.
- Through research and development at ILRAD, and through extensive collaboration with laboratories in developed countries, techniques and reagents are now available to study 14 bovine cytokines which contribute substantially to the Laboratory's extensive capacity to determine immune responsiveness and haemopoietic potential in trypanosomiasis and other diseases of ruminants.
- The programme has identified (in collaboration with scientists supported by EMVT/ORSTOM, France) parasite molecules, including a *T. congolense* cysteine protease specifically recognised in primary responses by infected trypanotolerant cattle. The molecularly engineered parasite molecule is being tested in a new approach to determine the feasibility of its use as an anti-disease vaccine.
- Extensive studies have examined the morphological changes of the bone marrow by using core biopsies and cytology and by collection of cells to examine cytokine profiles. These studies demonstrated that red blood cell production was inadequate in the acute phase of the disease in both N'Dama and Boran breeds. However, towards the end of the acute phase of the disease the N'Dama cattle increased more

effectively both red and white blood cell production in the bone marrow than Borans.

- The detailed study of parasite and anaemia control mechanisms in N'Dama and Boran cattle has assisted the monitoring of infected cross-bred and chimaeric cattle exhibiting different degrees of resistance to trypanosomiasis in concert with the genetics experiment described below.

ANIMAL GENETICS

Molecular Genetics

- In the development at ILRAD of the resource population of N'Dama x Boran cattle segregating trypanotolerance, all four of the planned F1 families were complete by mid-1993, with 37, 29, 22 and 21 full-sibs in each. The F2 population will be complete in 1995 and phenotyping for trypanotolerance status, through tsetse fly challenge with *T. congolense* and measurement of immunological, pathological and physiological responses according to the project's current protocols, started in December 1993, and will be completed by the end of 1996.
- For genetic mapping, two hundred and sixty two microsatellite-containing DNA clones have now been sequenced and primers have been designed to amplify the microsatellite region. These have yielded a total of 105 informative bovine markers. Together with other markers available in collaborating laboratories, this is sufficient for initial mapping purposes.
- Microsatellites are being genetically mapped by application to the International Bovine Reference Panel (which includes approximately 80 of the ILRAD F1 animals) and physically mapped to chromosomes in collaboration with Texas A&M University by application to DNA from a bovine/rodent hybrid panel. Approximately 10 markers have been mapped by both means and the process is expected to be completed for the entire panel of microsatellites in 1994.

Genetics of Disease Resistance

Genetic resistance to gastrointestinal parasitism in small ruminants:-

- Work implemented by ILCA in 1993/94 at the Kenya coast has confirmed that Red Maasai sheep are more resistant to endoparasites (primarily *Haemonchus contortus*) than Dorper and Dorper x Red Maasai and established that there is genetic variation in resistance within the Red Maasai breed.
- Results from Ethiopia indicate little difference in resistance to mixed infections of mainly *Trichostrongylus colubriformis*, *Ostertagia trifurcata* and *Haemonchus contortus* between the two Highland sheep breeds being studied (Menz and Horro), but do suggest reasonably large within-breed variation in resistance.

Genetics of trypanotolerance:-

- ILCA's work on genetics of trypanotolerance in 1993/94 continued to focus on refining genetic parameters, identifying heritable indicators of the trait and studying the genetic relationship between trypanotolerance and animal performance. Although most of this work has concentrated on N'Dama cattle, study of the trait in Zebu breeds has indicated genetic differences between breeds in their ability to resist the development of anaemia under trypanosomiasis challenge.

Characterization and Conservation of Animal Genetic Resources

- A comprehensive review of the Shorthorn cattle breeds of west and central Africa has been completed and status of these breeds determined and areas for further research identified. Similar reviews for the Zebu breeds, the White Fulani and the Gudali of west Africa and for Zebu and Sanga cattle of eastern and southern Africa are in progress. Initial population statistics and production figures have been produced on 117 cattle breeds, 56 sheep breeds and 45 goat breeds. Although generally incomplete, these data have been entered in the Domestic Animal Genetic Resources Information Database - also developed as part of this project.

PRODUCTION SYSTEMS RESEARCH

Production Systems Models and Analysis

- A conceptual framework for research in market-oriented smallholder dairying has been developed and implemented.
- ILCA has developed a computerised livestock information management system (LIMS) that enables NARS scientists to create standardised and readily analysable data sets for any livestock production system.
- ILCA has developed a bio-economic herd model adapted for the analysis of interventions in a number of different systems. In a recent application the potential financial returns to smallholder farmers of adopting crossbred cows for milk production were compared to systems in which the smallholders were dependent on indigenous cows. The use of crossbred cows purely for milk was also compared with their use for traction as well as milk production. Deriving draught power as a by-product of dairying, rather than as a specialised product of draught-oxen, gave an internal rate of return of over 70 %.
- A simulation model has been developed through collaboration between scientists from ILRAD and Texas A&M University for assessing and predicting the economic and nutritional impacts of alternative intervention strategies at the farm level.
- ILRAD and ILCA have established capacities to build Geographic Information Systems (GIS) that provide assistance in describing and analysing agricultural production systems. ILRAD has experience in developing and using GIS systems for the analysis of changes in the use of land and natural resources under varying constraints. Data sets have been collected for continental down to selected site-

specific levels for climate, vegetation, animal/vector/human/disease distribution and other parameters. This data has allowed the modelling of the predicted economic and ecological impact of livestock disease and its control. ILRAD is the lead centre for the new CGIAR/NORAGRIC/UNEP initiative for the development and acquisition of improved integrated GIS data bases for agricultural research.

- ILCA has applied agro-ecological zone modelling to determining the potential impact of forage legumes for livestock on food production for human consumption in 10 West African states, with much of the input data derived by experimentation conducted by ILCA itself, by NARS and by CIAT and CSIRO. The study concluded that except for Gambia, Niger and Nigeria, the countries of the region have land resources that would enable them to meet year 2025 food demand targets provided an intermediate level of inputs and improved livestock systems are adopted.

Feed Production and Utilisation

Conservation of germplasm and services to NARS:-

- ILCA provided an important service function in the supply of research quantities of seeds from the ILCA genebank for research and development of forages, and larger quantities from the Herbage Seed Unit for use in the establishment of seed production by NARS. In 1993 over 2000 samples of seeds were distributed from the genebank and an additional 250 samples of larger quantities were distributed from the Seed Unit.
- In 1994, facilities for virology and germplasm health were established to ensure that virus diseases are not distributed with the germplasm and to examine virus diseases in forages in collaboration with IITA and CIAT.

Forage germplasm characterization and evaluation:-

- The morphological characterization of *Sesbania sesban* was completed and an assessment made of the variation present within the genus. Research on anti-nutritional compounds in selected accessions in ILCA's collection of fodder trees, (*S. sesban*, *S. goetzei* and *S. keniensis*) showed that the major chemical compounds of this type are flavonol glycosides, which were identified in *S. sesban* and *S. goetzei* as quercetin through co-chromatography techniques against molecular standards. *Centrosema brasiliamum* is also being evaluated for use in the subhumid zone of Africa and indigenous and other exotic fodder tree species for the humid zone.

Utilization of tropical feeds:-

- Studies on the utilization of fodder trees as livestock feed have concentrated on studying potential anti-nutritional factors such as condensed tannins. However, there were no correlations between the levels of condensed tannins, rumen microflora activity, measured through gas production, and animal performance in feeding trials for *Acacia angustissima*.

- Further compounds in *Sesbania sesban* were identified as being toxic to rumen microflora. Studies on intake, digestibility and degradability of a range of crop residues supplemented with forages and fodder trees were carried out together with other feeding trials to determine effects of diets on rumen function and feed utilization. Data from these experiments is being incorporated into a data base on feeds for ruminant production in sub-Saharan Africa.
- Sufficient variations in nutritive value were found between different millet and cowpea types to indicate that it may be possible to select varieties for improved livestock nutrition using these crop residues in the semi-arid zone.

Physiology of tropical ruminants:-

- Results from investigations into the basic reproductive physiology of both female and male cattle assisted in the formulation of packages to minimise the impact of disease, suckling and nutrition on reproductive performance, and to optimize controlled management of reproduction to improve fertility under artificial insemination. It has been further observed that Zebu cattle may have different physiological priorities from cross-bred animals in nutrient utilization for the major production functions.

Natural Resource Management Aspects of Production Systems Research

Research continued to ascertain the effects on mixed crop-livestock farming on the production environment in arid and semi-arid, subhumid, humid and highlands ecozones of Africa.

Range trend monitoring:-

- Study of the factors controlling species dynamics, diversity, stocking rates and biomass extraction in the Sahel further substantiated that it is the amount and the distribution of rainfall and not livestock that ultimately determine the net biomass productivity in this region.

Feed improvement and production intensification:-

- By manipulating spatial and temporal and crop/forage combinations, food and feed productivity were improved per unit land area, in the cool highland zone. For example, combinations of wheat, oats, sorghum and maize with clover, cowpea, lablab and vetch in vertisols caused significant changes in the time of food and good quality fodder availability, suggesting the possibility of closely matching the human and animal needs during the year.

Livestock mediated nutrient cycling:-

- Factors such as the frequency of corralling livestock on cropland, livestock feed quality and supplementation strategies, rangeland productivity, cropland ratios, synchronizing nutrient release from manure and crop demands studies have been investigated to improve the role of livestock in nutrient cycling and in natural resource management. Corraling animals directly on the croplands showed that

nutrient release from the manure was faster than direct application of browse as soil mulch, emphasizing the possibility of corraling time and frequency, and changing feedstuffs, for synchronizing nutrient release and crop demand.

- Use of the modified MOTAD (Minimisation of the Total Absolute Deviation Model) indicated that integration of crop and livestock production, even under high risk aversion, resulted in a higher total farm income than crop farming alone. However, because of variable rangeland productivity in the Sahel, the model also estimated that about 45 to 200 ha of rangelands are required to manure 10 ha of cropland in a 3 ha/yr sequence suggesting the need for supplementary use of chemical fertiliser with manure.

SOCIOECONOMIC AND POLICY ANALYSIS

In 1993/94, ILCA predominantly developed macroeconomic analyses of the livestock production industry in Africa. ILRAD concentrated more specifically on socioeconomic assessments of the impacts of tickborne diseases and trypanosomiasis and the implications of control of these disease complexes. This led to substantial collaboration in the economic and environmental impacts of trypanosomiasis, particularly through joint work in the African Trypanotolerant Livestock Network (ATLN).

Macro economic policy research has been undertaken under two major headings, Policies, Markets and Technological Change and Policies, Institutions and Resource Management.

Policies, Markets and Technological Change:-

- In an analysis of the economic and socio-demographic factors affecting the demand for sheep in Ethiopia, a preliminary survey which included income and demographic characteristics of selected households in Addis Ababa was conducted. Econometric models are being applied to quantify the economic and socio-demographic factors affecting the demand for sheep, and cross-elasticity of prices for various food commodities will be estimated.
- The role of credit in promoting the uptake of livestock technology has been investigated through collection of farm level data for selected livestock credit projects in Ethiopia, Kenya, Nigeria and Uganda. Selected projects in Ethiopia, Kenya and Uganda focused on milk offtake while in Nigeria, the project focused on beef fattening. Farm level data on milk production, feed intake, milk disposal, household resource base, revenue, expenditure and credit information from sample households has been collected.
- Policy interviews and data collection have been carried out to determine the critical success factors for livestock policies in different sub-Saharan African countries using the contrasting experiences of Ethiopia and Kenya.

Policies Institutions and Resource Management:-

- Work in this area has concentrated in establishing the appropriate resource tenure policies governing increased crop-livestock interactions and agricultural productivity, by conducting studies at various sites with ATLN members and contrasting sites in Ethiopia. The potential influence of the presence or absence of trypanosomiasis control has been determined through examination of such parameters as ox-sharing, sharecropping and land use. Although several changes in land rights were determined in the study period no direct relationship between these changes and control of trypanosomiasis is noted. However, at the level of the individual farmer, the control of trypanosomiasis did have some impact on resource use, and these changes may ultimately lead to altered demand for new land tenure arrangements.
- The economic and environmental effects of crop-livestock integration have been studied in Ethiopia in the smallholder farming sector. The most important factors accounting for most of the variation in farm-household characteristics were found to be, in order of importance, farm size, household size, number of work oxen and access to gravitational irrigation.

Socioeconomic Studies of Technological Constraints

- Working with KARI, ILRAD's Socioeconomic programme is evaluating how the dynamics of tickborne disease (in this case ECF) epidemiology affect the productivity of smallholder dairying at Mura'nga in Kenya. The study is designed to provide indicators of disease epidemiology and productivity which can be used to gauge production and economic parameters in other systems.
- Economic impact models derived for ECF have been extended to the evaluation of the economic effects of trypanosomiasis and cowdriosis in selected countries in Africa.
- ILRAD and ILCA, national partners in Ethiopia and other international and non-governmental agencies (who have provided GIS data sets and satellite imagery) have been examining changes in land use and biodiversity resulting from trypanosomiasis control measures at the Ghibe valley in Ethiopia. By the end of 1994, the analysis of field data will be complete and the ability to link these results with recent satellite images will provide an historical perspective on land use change in the area. This study, aimed finally at the continental level of resolution, has led to a considerable increase in data accumulation and GIS capacity for determining the impacts of disease and other parameters on the ecology and productivity of key areas of the African continent.

OTHER PROGRAMME AREAS IN 1993/4

(i) Research support

The responsibilities of senior staff contributing to research support functions in the two livestock institutes presently differ. At ILRAD, the 4 SSY positions in 1994 encompass the position of Deputy Director General, Information and Planning Officer, the Laboratory Manager and the Veterinarian in charge of clinical medicine. At ILCA, the 3

SSY positions are the Research Operations Manager and 2 positions providing computer and biometrics expertise to the institute.

(ii) Training/Communications/Information/Library

Training. Despite substantial reductions in core funded training at ILCA (51%, 1992 actual expenditure on training compared to 1994 budget), a significant training programme was maintained during the year. This included four courses, three with special project support. Three of the four involved collaboration with other CGIAR centres (ICARDA (two) and ICRAF). Major new funding from the European Union has allowed the development of training courses for NARS in Eastern and Southern Africa through the ILCA associated collaborative research networks, new opportunities for graduate students and renewed work on training materials. Fourteen postdoctoral and 31 graduate associates, and 16 short-term individual trainees worked with ILCA scientists.

ILRAD has maintained approximately 25 research fellows at any one time during 1993/94 conducting research closely allied to the work of the Laboratory as part of their requirement for higher degrees. Visiting research fellows supported by external funds and two senior research fellows from the African continent gained post doctoral experience in biotechnology working within ILRAD's research programmes. More than 20 technical attachment trainees from national programmes have followed individual training at the laboratory in techniques appropriate to veterinary or human medicine practicable in their home institutions. In the period 1993/94, ILRAD held two major planning workshops in fields related to its research goals (in trypanotolerance and novel immunisation strategies) and held three courses in epidemiology and diagnostic techniques for participants from developing countries. ILRAD scientific staff have also contributed to courses held by other international (FAO, ISCTRC/OAU/IBAR, FAO/IAEA) and regional organisations (UTRO - Uganda, CIRDES - Burkina Faso) in subjects related to trypanosomiasis and/or tickborne diseases.

A new initiative is planned with IITA on a possible inter-centre training programme for NARS in sub-Saharan Africa. The objectives of this new initiative are to provide training that draws on the expertise of more than one centre to cover topics of crop/livestock/policy research structured and presented in ways most relevant to NARS needs. It will also serve as a single entry point for NARS into a CGIAR training programme using existing CGIAR training staff and facilities. This new initiative is being discussed with all CGIAR centres working in sub-Saharan Africa and NARS with a view to a fundable project proposal during 1994/95.

Information Services. Progress was made to integrate the ILRAD and ILCA information resources in support of animal health and production research. Plans were advanced to establish a global information service in support of livestock research through partnerships with relevant national, regional and international information systems and networks from all over the world. The plan for subject-specific global information services has been endorsed by the CGIAR.

ILCA supported activities in the area of Training, Information, Counselling and Networks with 9 SSY positions in 1994. These were 1 SSY for Training and

Conferences, 4 SSY in Documentation/Dissemination and 4 SSY in Management Counselling and Networks (of whom 3 were devoted to coordination of NARS Research Support Networks in Africa). ILRAD had one Training Officer, one Scientific Editor and a position in Management Counselling for collaborative research links - a total of 3 SSY. The combined staff of both institutes committed to these areas was 12 SSY in 1994.

(iii) Administration and Operations

ILCA's administration in 1994 functioned with 3 SSY in the office of the Director General (Director General, Director of Administration and a Director of the Donor and Board Secretariat), 1 SSY responsible for institutional finances, and 2 SSY for general operations. At ILRAD, the equivalent management and administrative functions were performed by 2 SSY in the office of the Director General (Director General, Director of Administration), 1 SSY responsible for institutional finances and 1 SSY overseeing general operations. The combined total in these areas is 10 SSY in 1994 with administration and operations costing an estimated \$ 4,386,000 of which \$ 346,000 was contributed by combined expenses of the Boards of both institutes.

(iv) Note on the relation to TAC activities

As can be seen from Table 2a, the combination of ILRAD and ILCA senior manpower into priority programmes in 1994 yielded an approximate demarcation by TAC category of 12.8 SSY in category 1, 5.2 SSY in category 2, 49.9 SSY in category 3 (the largest manpower allotment to the area of Production Systems Development and Management), and 7.8 SSY in category 4. Thus, a combined total of 75.7 SSY were committed to research activities in the two institutes in 1994.

THE BUDGET FOR THE CURRENT YEAR - 1994

(i) Operating expenditures

ILCA and ILRAD's combined operating expenditures are expected to be \$ 24,285,000 in 1994, which compares with an original combined budget of \$ 24,750,000.

(ii) Inflation/Exchange Rates

Both ILCA and ILRAD are operating in countries with volatile exchange rates and high inflation. In 1994 the main adverse factor has been a revaluation of the Kenya shilling. The 1994 budgets were originally calculated at a rate of 70 Kenya shillings to the dollar whilst the rate has appreciated to 56.

(iii) Capital expenditures

Standard capital expenditure at both ILCA and ILRAD is expected to be in line with budget at \$ 1,457,000.

As an additional outstanding requirement, ILRAD has authority from TAC (ILRAD MTP 1994/98) to construct a new vaccine facility for the testing of molecularly-engineered, recombinant vaccine antigens using core resources. The government of Australia has already committed Australian dollars 150,000 to the construction of this facility. ILRAD in 1994 has to date commanded insufficient extra funds to undertake construction of the facility. Should donor funding for 1994 be in excess of the anticipated programme requirements at level 2, ILRAD will use the additional donor contributions to start construction of the vaccine facility. If this is not feasible within 1994, steps will be taken to identify funds for this purpose in 1995.

(iv) Earned income

In 1994 this is expected to be \$ 960,000 but includes an exceptional item of approximately \$ 450,000 at ILCA in respect of the write back of some provisions.

(v) Donor Funding

ILCA and ILRAD anticipate combined donor funding of \$ 21,824,000 in 1994. When taking into account depreciation of \$ 2,113,000, earned income of \$ 960,000 and capital expenditure of \$ 1,457,000 there is a cash shortfall for the year of \$ 845,000. This has been financed from cash reserves built up in earlier years.

Funding request for 1995

THE RESEARCH PLAN FOR 1995

The Indicative MTP for ILRI has laid out priority research areas, new regional initiatives, and regroupings and redistribution of scientific manpower to address the wider research mandate and institutional linkages expected for the new CGIAR livestock research institute. However, so as to maintain the momentum of existing priority research activities, and in recognition that the incoming ILRI Board and Director General must establish appropriate ownership of the new research direction and programme portfolio, 1995 is viewed as a transitional year in the evolution of ILRI. The programme for 1995 therefore draws on some of the existing programmes in Animal Health, Ruminant Genetics, Production Systems Research and Socioeconomic and Livestock Policy, but makes early adjustments in line with the Indicative MTP. Further provisions are made to establish funds for the development of new programme activities either in regions outside SSA, or for re-evaluation of potential additional strategic research programmes. The likelihood is that 1995 will be a year of consolidation in some areas and programme development in others. The aim is to reorient programme focus and balance so that ILRI will establish activities envisaged in the base MTP for ILRI by 1996.

ANIMAL HEALTH

Tickborne disease research

The major effort will be placed on a full exploration of the p67 antigen to protect cattle against challenge with *T. parva* to the levels of pen trials. In collaboration with scientists from EMVT, France and the USAID/Florida/Zimbabwe Heartwater Project, ILRI will extend its expertise to define immune responses to potential vaccine antigens of *Cowdria ruminantium*. Similar studies on the exploration of tickborne disease vaccines for other disease organisms will be undertaken in collaboration with ARI Queensland and The Universities of Washington State and Florida. ILRI's laboratory-based programme will utilise the new parasite cDNA screening method to evaluate potentially protective schizont antigens of *T. parva* and will investigate the characterisation of parasite antigens stripped from bovine immune T-cells. The programme will continue to provide reagents and information for improved integrated control of tickborne diseases to national programmes. Vaccine development studies will encompass new knowledge of responding immune cells and vaccine delivery systems in target populations of livestock. Increasingly, these facilities will be extended to tickborne disease organisms having a global distribution.

Trypanosomiasis Research

Emphasis will shift from the development of diagnostic tools to their application in given production systems to determine the effects of disease on livestock productivity. Similarly, existing tools for assessing parasite drug resistance will be incorporated into epidemiological studies to determine better the effects of trypanocide resistance on the productivity of livestock in tsetse affected areas. Research will continue to emphasise the elucidation of the molecular basis of drug resistance in trypanosomes. The extension

of relevant technologies and epidemiological techniques to trypanosomiasis affected areas of LAC and Asia is planned. Building on the recent advances in understanding the molecular interactions between trypanosomes and the homeostatic mechanisms of the ruminant host, work on parasite development in livestock and the activation or suppression of host macrophages will be integrated to determine how ruminants control parasite growth. Differences between trypanoresistant and trypanosusceptible cattle will be exploited, including the immunological response of trypanotolerant cattle to potentially harmful parasite enzymes, to evaluate the potential of anti-disease vaccines. This work will be integrated with the observed differences in the immunological and haemopoietic capacity of cross bred animals evaluated in conjunction with the genetic experiment in trypanotolerance.

Expected Outputs of the Animal Health Programme in 1995

As a product of continuing research trends and the convergence offered by the combination of institute programmes, epidemiological research on the two disease complexes will be closely geared to productivity indicators and assessment of the impact of livestock disease on productivity. ILRI will expect to evaluate the potential of a vaccine antigen against ECF under experimental conditions and to establish the feasibility of an anti-disease vaccine against trypanosomiasis. Molecular physiological research will identify host and parasite molecules responsible for maintenance or control of disease in trypanosomiasis and may provide evidence of target genes for the parallel genetic evaluation of trypanotolerance. Research in molecular immunology will identify alternative vectors for the delivery of potential vaccine antigens against ECF and the comparative roles of T-lymphocytes in protective responses of ruminants to disease will be determined.

ANIMAL GENETICS

Molecular Genetics

The molecular genetic analysis of disease resistance in the N'Dama x Boran resource herd segregating the trypanotolerance trait will continue in 1995 with the phenotyping of the F2 generation. No further genetic markers will be made but the existing map will be employed in the genotyping and data analysis of the segregating population. The techniques and reagents will be extended to the genotyping of the Red Maasai/Dorper crossbred flock of sheep in which indigenous resistance to helminthiasis is being investigated. Further, molecular markers will be used for the characterisation of populations of indigenous breeds of ruminants to assist the characterisation and conservation of animal genetic resources within the FAO's conservation programme.

Genetics of Disease Resistance

Research will be implemented in Zaire, Cote d'Ivoire and Senegal, to quantify the amount of genetic variation in traits characterising trypanotolerance and their genetic relationship with production traits. Between breed differences in tolerance will also be estimated. This work will contribute to the development of selection programmes to increase livestock productivity in tsetse-infested areas. Work will also continue in Ethiopia, Kenya and Senegal to assess and delineate the mechanisms of resistance to

helminth endoparasites in breeds of sheep and goats demonstrated to exhibit resistance to these parasites.

Characterisation and Conservation of Animal Genetic Resources

Work will support the FAO programme, initially in Africa, for the characterisation and conservation of indigenous tropical livestock and their utilisation to increase sustainable livestock production without reducing genetic diversity, and thus to ensure that this diversity is safely maintained and made available for productive use in research and animal improvement programmes. In 1995, testing of the methods for breed characterisation will take place with national programmes in Nigeria, Ghana, Kenya and Zimbabwe. Additional specific studies on adaptive traits in ruminants will be continued. These traits will include growth, body fat deposition and nutrient partitioning mechanisms exhibited by Ethiopian highland sheep breeds, and parasite resistance and heat tolerance in sheep and cattle breeds in Zimbabwe.

Outputs from the animal genetics programme in 1995

ILCA and ILRAD have to date conducted complementary genetic approaches to the study of heritable disease resistance in ruminants. The further integration of the existing programmes and the centrality of the molecular genetic approach to these studies, and to the conservation of animal genetic resources, establish ILRI's strong base for research in this field. ILRI's mapping efforts in relation to trypanotolerance will enhance and refine the map of the bovine genome in collaboration with other laboratories. The existence of trypanotolerance in other breeds of livestock and the extent to which demonstrated resistance to helminthiasis in breeds of small ruminants indigenous to Africa is heritable will be established. ILRI will expect to make its expertise available to regions outside SSA, particularly in conjunction with collaborative efforts with the FAO, to characterise and conserve animal genetic resources.

PRODUCTION SYSTEMS

Models for Production Systems Analysis

Some capacities in analytical methods and computerised models addressing the impact of specific parameters (e.g. livestock disease) on the productivity of mixed farming systems are available within ILRAD and ILCA (see research highlights section). However, the formation of a critical mass of scientists working in this area, comprised of different disciplines to develop strategic models appropriate to a wide range of production systems, as envisaged in the Indicative MTP, will await managerial decisions and the potential acquisition of further skills in this area of research by ILRI through 1996. The analysis of agricultural systems involving animal agriculture will not only be concerned with the primary products (milk, meat, fibre, hides, traction, fuel), but with the role of livestock in the recuperation and conservation of natural resources, the utilisation of by-products and wastes, and their social importance to producers in integrated farming systems. Impact will be measured in terms of the animals' contributions to optimising the long term socio-economic and environmental benefits of the production systems as a whole. The goal will be to integrate data covering all aspects of livestock production systems into widely usable predictive model systems

Together with institute expertise in socioeconomics and policy analysis this unit is anticipated to provide ILRI with predictive evaluations of changes in production systems, research impacts and priority setting.

Feed Production and Utilisation

Research will be continued in the areas of fodder and feed development, feed utilisation and feeding systems.

Fodder and Feed Development. Projects established in the subhumid and cool highland zones of Africa will continue with work on forage germplasm evaluation, and feed production strategies to meet seasonal feed requirements of smallholder crop-livestock farmers in Nigeria. Forage germplasm characterisation in Ethiopia, and feed/fodder development and management practices in integrated crop-livestock systems in Ethiopia and Nigeria will also be continued.

Evaluation of germplasm of promising species will be continued in the subhumid zone and will be expanded to the semi-arid zone as part of the eco-regional initiative on desert margins in close collaboration with other Centres. Evaluation of the nutritional and anti-nutritional value of fodder trees will continue in the humid zone and cool tropics and will be closely linked to feed utilization and research in rumen ecology.

Strategic research on the identification and elimination of forage viruses and use of *in vitro* culture for germplasm management will be continued. New initiatives in characterization, using traditional morphology and techniques such as isozyme and phytochemical analysis, will focus on fodder tree species with potential as ruminant feeds.

Feed utilization. This area will examine aspects of the physiology of tropically adapted ruminants in relation to feed utilisation. In 1995, the feasibility of ILRI conducting molecular physiological research on rumen ecology will be reviewed in collaboration with advanced institutes undertaking relevant research in developed countries. The programme, will continue to investigate the variation in postpartum nutrient and body reserve utilisation for milk production and reproduction among cows of high and low dairy productivity. Mechanisms of fat deposition and release and the extent to which this is modulated by physiological status and genotype will help to understand better the adaptation of dairy cattle of different genotype to the tropics. Studies will be extended to the relationship between insulin and glucose metabolism and pituitary-ovarian function and to the limiting effect of energy deficit and low insulin on ovarian responsiveness to gonadotrophic stimulation in low and high yielding cows. In addition, research on multipurpose cows will investigate the effect of work on the physiology of crossbred cows at different stages of the reproductive cycle and how this affects reproductive efficiency. The relationship between body (energy) reserves and reproduction in cows used as draft animals will also be investigated.

Feeding systems. Established projects on improving feeding systems and management in the semi-arid and cool tropic zones of Africa will be pursued in 1995.

In Niger the projects will focus on identification of nutritional constraints for increased output of ruminants in mixed crop-livestock systems of the semi-arid regions of West

Africa and developing strategies to overcome these constraints mainly through the use of crop residues.

In Ethiopia the projects will focus on two aspects based on previously established cropping packages. The fodder from cropping systems will be tested with milking cows to determine milk yield and weight change which could influence reproductive performance. A feed evaluation model using data based on results from animal response trials, physiological studies and chemical analysis based on the feeds available in the mandate area will be developed. Whilst some aspects of the physiology of adaptive traits will be pursued under the conservation of animal genetic resource programme, the feasibility of ILRI undertaking work on the manipulation of rumen function *vis-à-vis* the capacity of institutes in developed countries to support such studies, will be the subject of a review mounted by the institute with external consultants in 1995.

Expected Outputs of Integrated Production Systems Research in 1995

Through the integration of ecoregional research on animal feed, natural resource management issues and other parameters of mixed crop-livestock production systems, ILRI will establish a strategic approach to the analysis of factors limiting the productivity and sustainability of these agricultural systems. Major opportunities for extrapolating the substantial information gained in the three major ecoregions of Africa to comparable ecoregions in other developing regions will come from the envisaged linkages and programme development for production systems research in other continents (see below).

Ecoregional research on production systems

In SSA, work is envisaged as continuing in three ecoregions. In Nigeria (the humid/subhumid zone), feed production strategies will be developed to meet the seasonal feed requirements of smallholder crop-livestock farmers. In the semi-arid ecoregions, work in Niger will examine feed resource use for improved nutrition of ruminants in mixed crop-livestock systems and examine sustainable productivity and natural resource management in crop-livestock systems in the zone. This work will effectively link research on the role of livestock to the inter-Centre initiative on desert margins led by ICRISAT. In the cool highland tropics of Ethiopia, projects to improve crop-forage integration and nutrient management, and resource assessment for forage technology development and transfer will be carried out. A new initiative in watershed management for improving and sustaining crop and livestock production of vertisols of this region will be pursued in Ethiopia with ICRISAT and NARS.

Asia, LAC and WANA. Neither ILCA nor ILRAD has carried out integrated production systems research outside continental Africa previously. The present P&B for ILRI sets aside approximately \$ 1 million to forge network links and establish research priorities through meetings, consultancies and workshops in 1995. The new system-wide livestock strategy and the indicative MTP establish that the research agenda of Asia is sufficiently large to warrant substantial ILRI commitment to this region in the first instance. The two major ecoregions, the arid/semi-arid and the humid/subhumid zones represent livestock productivity and integrated agricultural problems of differing dimensions and the relative priorities of these, and ILRI's capacity to provide strategic

research assistance, will be the subject of analysis with relevant international and new regional partners in 1995. ILRI's involvement in LAC is likely to be through provision of support to the existing forage and pasture development programmes of CIAT, and in WANA, support for livestock and natural resource management issues in the small ruminant/barley/fallows rotation system being evaluated by ICARDA.

SOCIOECONOMICS AND POLICY ANALYSIS

ILRI will concentrate on the socioeconomic effects of disease at the level of production systems seeking to identify key indicators of disease epidemiology and animal production, particularly as it relates to smallholder dairying. Production system analysis will be extended to the farm level employing analytical models designed in developed countries for such analysis. Improved data on the economics of major diseases, both singly and in concert, will allow the development of national strategies for integrated control of livestock diseases. For instance, in 1995, the specific impacts of heartwater in Zimbabwe will be linked through modelling to predict the economic and production effects of other tickborne diseases. The environmental impact assessment studies of disease and disease control will be expanded in eastern Africa and extended to sites in southern and western Africa. The acquisition of data from these and other sites will contribute to a continental analysis through 1995 and beyond. Through the CGIAR/NORAGRIC/UNEP initiative, ILRI will coordinate the development and acquisition of new system-wide data covering crop and livestock production and natural resource management issues which will improve modelling capacity for agricultural production in all ecozones.

Livestock policy studies will continue in 1995 under five major headings. Policies, markets and technological change; Animal health and disease control policy; Regional trade; Economic integration and livestock development; Policies, Institutions and Resource management and assessment of the impact of livestock research conducted in collaboration with ISNAR. New projects anticipated for 1995 will involve research on Integrated crop-livestock agricultural systems and their impacts on household food security in the central Ethiopian highlands, which will be conducted with national programme collaborators and the University of Hawai. The second is Policy analysis to support appropriate reforms of the market in sub-Saharan Africa to be conducted in collaboration with IFPRI. And the third, will examine Regional trade, economic integration and livestock development in Africa.

Expected Outputs from Socioeconomic and Policy Research in 1995

1995 will see the further integration of socioeconomic and policy research both between the research manpower of the existing institutes and between this group and the three other major research programmes. Improved economic and ecological impact assessments will be made particularly for the impact of livestock diseases and their control in 1995. The programme on the impacts of trypanosomiasis and its control will be extended from the present focus in Ethiopia to sites in southern and western Africa. ILRI will link with other Centres of the CGIAR in the development of GIS capacity and databases for production systems and impact assessment. Macroeconomic policy will examine the advantages of regional trade in Africa and will increasingly, in collaboration

with IFPRI, evaluate strategic policy questions centered on household food security and livestock market reform on the efficiency of agricultural productivity.

OTHER PROGRAMME ACTIVITIES AND RESEARCH SUPPORT

Research Support

Seven SSY positions in this category are to be initially carried into the formation of ILRI, although the position descriptions and the relative balance of manpower within the Administration, Operations and Research Support categories will be subject to review and rationalisation as the programmes and supporting management structure of the new institute are defined. The Indicative MTP envisages an eventual requirement for a total of 13 SSY for all 3 categories with a minimum of 5 SSY in Research support.

Training/Information/Library/Networks

ILRI's programme for strengthening national research capacities is described under three major headings:

Training. The initial aims will be to integrate existing ILRAD and ILCA training into a coherent programme for individual NARS scientists linked with the ILRI research programme. Research Fellows conducting programme-related research at the Nairobi Laboratory will be supported from programme funds. To address the enlarged global mandate the department will plan and obtain funding to extend ILRI training to NARS both within and outside sub-Saharan Africa seeking, where appropriate, to integrate aspects of animal health and animal production into wider agricultural production systems. Together with the ILRI research programmes, the Training Department will assist development of technology transfer. The Department will continue to develop the initiative for an inter-Centre training programme for sub-Saharan Africa, and initiate discussions with other CGIAR centres for a possible system-wide training programme in livestock research.

Documentation, Publication and Dissemination of Information. It will be necessary to complete the integration of the ILRAD and ILCA information resources, and subsequently new mechanisms will be explored for information transfer as part of a current System-wide initiative and to continue development of the global information network. This could include strengthening links with FAO/AGRIS. It will be important to rapidly establish ILRI publications and distribution policies, and begin to inform the public and stakeholders of ILRI and its activities.

Networks and Organisation Management Counseling. In late 1994 there will be an external review of ILCA's experience with networking, and of the 3 collaborative research networks associated with ILCA. Recommendations arising from this review will be considered in the rationalisation of services in the general area of NARS strengthening in ILRI in 1995.

ILRI will continue ILCA and ILRAD's participation in the evolving mechanisms for regional collaboration and prioritisation of NARS research in sub-Saharan Africa. In

particular, the frameworks for action and relations to existing networks and regional bodies will be an important concern for ILRI in 1995.

As part of the regional initiatives planned in 1995, possible linkages to existing networks in LAC and Asia will be explored as a means of extending ILRI's partnerships with NARS through research and activities to strengthen and support NARS livestock research.

With immediate reduction of 1 SSY to a total of 11 SSY in 1995, and the support of post doctoral fellows, previously supported at ILCA by training funds, now charged to respective programme activities, a reduction in costs of approximately \$ 700,000 is envisaged in 1995. Within the year, and in consultation with the new ILRI management, further rationalisation of the capacity of the two institutes can be expected even accommodating the need to establish links to networks and training opportunities in different regions. This will be subject to decisions as to the level of these interactions (i.e. with the ILRI project office, programme staff or through network liaison officers).

Administration and Operations

Within 1995, ILRI can expect to rationalise its administration and operations. It will for instance require a single Director General and a single Board. The definitive deployment of other SSY in this category will be dependent partly on the choice of headquarters site, and partly on the structures adopted for such offices as external and public relations, the management of general operations, and the relative requirements for scientific planning and management (presently under research support). Thus, whilst the exact reorganisation in this area is to be determined, a reduction of 2 SSY and a saving of approximately \$ 427,000 is envisaged in this area. Such reduction is considered attainable, provided decisions are taken at an early stage by the ILRI Board and Management.

Note on the Relation to TAC activities

ILRI will commence 1995 with an increase in 1.4 SSY committed to TAC activity 1, Conservation and Management of Natural Resources, with the major addition being to livestock conservation efforts as part of the global initiative on animal genetic resources led by FAO. Activity costs will rise commensurately from \$ 2.925 million to \$ 3.401 million in 1995. There will also be a rise to 6.2 SSY in activity category 2, Germplasm Enhancement and Breeding, by the addition of 1 SSY to the programme evaluating the resistance to helminthiasis of indigenous breeds of small ruminants. Although there is a slight reduction of 1.6 SSY to a total of 48.3 SSY envisaged for Production Systems Development and Management (TAC activity 3) in 1995, the \$ 1 million set aside for the establishment of the regional initiatives in production systems research is reflected in an increased overall cost in this area to just over \$ 8 million. ILRI will increase its commitment for Socioeconomic and Policy Research, in line with the Indicative MTP, by an increase of 1 SSY in TAC activity category 4. The increase in SSY in 3 activity areas, and the increase in expected costs (despite slightly reduced manpower) in a fourth activity area, will be offset by expected savings in Institution Building and Research Management resulting from rationalisation in the formation of a single institute.

General Observations

In 1994, the combined operating expenditures for ILCA and ILRAD are estimated at \$ 24,285,000. For 1995, the total operational requirement for ILRI is \$ 25,652,000. This represents a net increase of \$ 1,367,000 consisting of a provision of \$ 500,000 for price increases (2%) and other increases in expenditure of \$ 867,000 (3.5%). It must be noted however that the total requirement for 1995 includes a new budget of \$ 1,000,000 for regional initiatives in Asia, LAC and WANA corresponding to about 5 SSY's. Cost savings to fund the establishment of the new initiatives, principally in production systems research in regions outside SSA have been identified from the existing programme in Production Systems Research, Institutional Strengthening and Administration and Operations. Earned income in 1995 is estimated at \$ 552,000 leaving a net required operating fund of \$ 25,100,000. TAC has set aside funds for four System-wide research programmes including a sum of \$ 4 million for an inter-Centre livestock research initiative. ILRI will submit separately to TAC a supplementary budget containing proposals for the establishment of an inter-Centre Livestock Programme Group and appropriate projects of trans-regional significance. For this reason, manpower and costs relating to the specific inter-Centre livestock initiative are not given in this document which relates only to ILRI core activities.

(i) Operating expenditures

ILRI operating expenditure is expected to be \$ 25,652,000 in 1995. This is an increase of \$ 1,367,000 over the combined ILCA and ILRAD estimated expenditure for 1994. The details of the anticipated costs are given by TAC activity and CGIAR research classification in Tables 1a and 2a.

(ii) Inflation/Exchange Rates

Given the uncertainties and complexities of the situation (having yet to define the relative manpower balance to be supported at the two main country sites) no attempt has been made to make a detailed calculation of the effects of inflation and exchange rates other than to make a general provision of \$ 500,000.

(iii) Capital Expenditure

Capital expenditure for ILRI has been provisionally estimated at the equivalent of the depreciation charge of \$ 2,186,000 in 1995. The new Board of ILRI, when constituted, will be expected to refine institutional requirements in consultation with senior management.

(iv) Earned income

In 1995 this is estimated at \$ 552,000.

(v) Donor Funding and Impact of request on ILRI programme

The total of funding requested in 1995 is \$ 25,100,000 which will enable the new institute to carry out the programme set out in this document. As some uncertainties in the management structure, and the rate of integration of the programmes and methods

of operations of the two institutes will persist into early 1995, the financial estimates have been derived based on the priority programmes continued from 1994 with certain modification to meet new needs.

(vi) Object of Expenditure Analysis

Due to the formation of the new institute comparisons between ILCA and ILRAD between 1994 and 1995 are only of limited value (but see Table 4). The main change results from the proposed setting up of new regional initiatives by ILRI for which \$ 1 million has been set aside in 1995. This will be accommodated by unallocated savings of \$ 350,000 in administrative and operational cost, and further savings of \$ 650,000 against other objects of expenditure. Changes within other objects of expenditure are personnel (1.1%), supplies and services (- 0.3%), operational travel (1.9%) and depreciation (3.5%).

Staff Positions

In the move from a combination of ILCA and ILRAD manpower complements in 1994 to the establishment of ILRI in 1995 with 103.5 SSY, there is an overall reduction of 1 SSY. Within this total, ILRAD carries forward 7.5 staff whose salaries are funded from external sources. ILCA brings forward one similarly funded SSY. In TAC's evaluation of individual centre MTPs based on the originally projected programmes of work for all Centres in the period 1994 - 1998, ILRAD was anticipated to have a manpower complement in 1995 of 57 SSYs and ILCA to have 51 SSYs in that year. The ILRI establishment total of 103.5 positions in 1995 is 4.5 positions under the TAC approved level for the combined institutes and, of these, a total of 8.5 SSY have external salary support. Therefore, staffing supported by core resources in 1995 in ILRI will be 95 SSY. Following the development of programmes in regions outside SSA, through consultation in 1995, core funds will be used from 1996 onwards to establish appropriate additional positions up to the 109 SSY envisaged as the base requirement in the Indicative MTP for ILRI.

Table 1a: Core Funding Requirement by Cost Center
(Senior Staffyears and US\$'000)

		1994 Estimate		1995 Proposal		Change from Current Year Estimate	
		SSY	\$'000	SSY	\$'000	SSY	\$'000
Disease control/Epidemiology	ILCA						
	ILRAD	7.4	703				
	ILRI	7.4	703	7.8	741	0.4	38
Genetic Resistance /Vaccines	ILCA						
	ILRAD	10.3	1,150				
	ILRI	10.3	1,150	9.4	1,050	(0.9)	(100)
	<i>Subtotal</i>	17.7	1,853	17.2	1,791	(0.5)	(62)
Epidemiology/Biology	ILCA						
	ILRAD	3.5	743				
	ILRI	3.5	743	3.5	743		
Parasite Antigens	ILCA						
	ILRAD	6.0	733				
	ILRI	6.0	733	4.3	525	(1.7)	(208)
Vaccine Development	ILCA						
	ILRAD	5.3	669				
	ILRI	5.3	669	6.9	871	1.6	202
	<i>Subtotal</i>	14.8	2,145	14.7	2,139	(0.1)	(6)
	Total Animal Health	32.5	3,998	31.9	3,930	(0.6)	(68)
Conservation	ILCA	1.2	403				
	ILRAD						
	ILRI	1.2	403	2.2	683	1.0	280
Molecular Genetics	ILCA						
	ILRAD	3.2	355				
	ILRI	3.2	355	3.6	399	0.4	44
Quantative Genetics/Disease Resistance	ILCA	5.2	1,127				
	ILRAD						
	ILRI	5.2	1,127	6.2	1,407	1.0	280
	Total Animal Genetics	9.6	1,885	12.0	2,489	2.4	604
Feed Utilisation/Rumen Ecology	ILCA	1.2	252				
	ILRAD						
	ILRI	1.2	252	1.2	282		30
Physiology of Ruminants	ILCA	2.9	588				
	ILRAD						
	ILRI	2.9	588	2.9	618		30
	Total Nutrition/Physiology	4.1	840	4.1	900		60
Forage Genetic Resources	ILCA	2.6	844				
	ILRAD						
	ILRI	2.6	844	2.6	994		150
Feed Resources	ILCA	4.1	628				
	ILRAD						
	ILRI	4.1	628	4.1	628		
	Total Feed Resources	6.7	1,472	6.7	1,622		150

Table 1a: Core Funding Requirement by Cost Center (continued)
(Senior Staffyears and US\$'000)

			1994 Estimate		1996 Proposal		Change from Current Year Estimate	
			SSY	\$'000	SSY	\$'000	SSY	\$'000
6. Production Systems								
	Impact Analysis/Prediction	ILCA ILRAD ILRI			1.6	176	1.6	176
		<i>Subtotal</i>			1.6	176	1.6	176
	Farm Level Integration	SSA ILCA ILRAD ILRI	9.9	1,699				
		<i>Subtotal</i>	9.9	1,699	8.3	1,703	(1.6)	4
		Asia ILCA ILRAD ILRI						
		LAC ILCA ILRAD ILRI						
		WANA ILCA ILRAD ILRI						
		<i>Subtotal</i>	9.9	1,699	8.3	1,703	(1.6)	4
	Regional Initiatives	Asia ILRI				600		600
		LAC ILRI				200		200
		WANA ILRI				200		200
		<i>Subtotal</i>				1,000		1,000
	Re-organisation reduction	ILRI			(1.0)	(250)	(1.0)	(250)
	Total Production Systems		9.9	1,699	8.9	2,629	(1.0)	930
6. Natural Resource Management in Production Systems								
		SSA ILCA ILRAD ILRI	4.1	916				
		<i>Subtotal</i>	4.1	916	4.1	916		
		Asia ILCA ILRAD ILRI						
		LAC ILCA ILRAD ILRI						
		WANA ILCA ILRAD ILRI						
	Total Natural Resource Management in Production Systems		4.1	916	4.1	916		
7. Livestock Policy								
	Socio-Economic Policy	ILCA ILRAD ILRI	3.3 3.0 6.3	524 239 763				
	Economic impact & Animal Health	ILCA ILRAD ILRI	1.5 1.5 1.5	482 482 482	7.3	1,013	1.0	250
	Ecological & Economic Analysis	ILCA ILRAD ILRI	1.0 1.0 1.0	119 119 119	1.0	119		
	Total Livestock Policy		8.8	1,364	9.8	1,614	1.0	250
Sub-Total Research Activities			75.7	12,174	77.5	14,100	1.8	1,926
Research Support		ILCA ILRAD ILRI	3.0 4.0 7.0	599 1,657 2,256	7.0	2,324		68
Sub-Total Research Support			7.0	2,256	7.0	2,324		68
Training/Communications/Information/Networks								
	Training and Conferences	ILCA ILRAD ILRI	1.0 1.0 2.0	668 396 1,064	2.0	614		(450)
	Documentation and Dissemination	ILCA ILRAD ILRI	4.0 1.0 5.0	816 486 1,302	5.0	1,302		
	Management Counselling/Networks	ILCA ILRAD ILRI	4.0 1.0 5.0	810 180 990	5.0	990		
	Re-organisation savings	ILRI			(1.0)	(250)	(1.0)	(250)
Sub-Total Training/Communications/Information/Networks			12.0	3,356	11.0	2,656	(1.0)	(700)

Table 1a: Core Funding Requirement by Cost Center (continued)
 (Senior Staffyears and US\$'000)

			1994 Estimate		1995 Proposal		Change from Current Year Estimate	
			SSY	\$'000	SSY	\$'000	SSY	\$'000
Administration/Operations								
Administration								
	Board of Directors	ILCA		216				
		ILRAD		130				
		ILRI		346		196		(150)
	Office of Director General	ILCA	3.0	585				
		ILRAD	2.0	519				
		ILRI	5.0	1,104	5.0	1,104		
	Finance	ILCA	1.0	311				
		ILRAD	1.0	336				
		ILRI	2.0	647	2.0	647		
	Purchasing	ILCA						
		ILRAD		296				
		ILRI		296		296		
	Personnel	ILCA		166				
		ILRAD		96				
		ILRI		262		262		
General Operations								
	Engineering	ILCA	0.4	112				
		ILRAD		728				
		ILRI	0.4	840	0.4	840		
	Transport	ILCA	0.4	112				
		ILRAD	0.2	165				
		ILRI	0.6	277	0.6	277		
	Services	ILCA	0.4	112				
		ILRAD	0.2	300				
		ILRI	0.6	412	0.6	412		
	Catering	ILCA	0.4	112				
		ILRAD	0.2	68				
		ILRI	0.6	180	0.6	180		
	Housing	ILCA	0.4	112				
		ILRAD	0.2	(138)				
		ILRI	0.6	(26)	0.6	(26)		
	Stores	ILCA						
		ILRAD	0.2	48				
		ILRI	0.2	48	0.2	48		
	Re-organisation savings	ILRI			(2.0)	(350)	(2.0)	(350)
Sub-Total Administration/Operations			10.0	4,386	8.0	3,886	(2.0)	(500)
Depreciation								
		ILCA		1,057				
		ILRAD		1,056				
		ILRI		2,113		2,186		73
Total Operations			104.7	24,285	103.5	25,152	(1.2)	867
Inflation						500		500
Total Operating Programme			104.7	24,285	103.5	25,652	(1.2)	1,367
II. Less: Center Income								
		ILCA		760				
		ILRAD		200				
	Total Center Income	ILRI		960		552		(408)
Total Operating Funds Required								
		ILRI		23,325		25,100		1,775

Table 2a: Core Operations - Program and Activity Requirements
(Senior Staffyears and US\$'000)

				1994 Estimate		1995 Proposal		Change from Current Year Estimate	
				SSY	\$'000	SSY	\$'000	SSY	\$'000
A. Research Activities									
1. Conservation and Management of Natural Resources									
1.1	Eco-system Conservation and Management			5.1	1,323				
		ILCA							
		ILRAD							
		ILRI		5.1	1,323	5.1	1,323		
1.2	Germplasm Collection, Conservation, Characterisation, and Evaluation								
1.2.1	Forages			3.3	844				
		ILCA							
		ILRAD							
		ILRI		3.3	844	3.3	996		152
1.2.2	Livestock			1.2	403				
		ILCA							
		ILRAD							
		ILRI		4.4	758	5.8	1,082	1.4	324
		Sub Total		7.7	1,602	9.1	2,078	1.4	476
		Total Activity 1		12.8	2,925	14.2	3,401	1.4	476
2. Germplasm Enhancement and Breeding									
2.2	Livestock			5.2	1,127				
		ILCA							
		ILRAD							
		ILRI		5.2	1,127	6.2	1,407	1.0	280
		Total Activity 2		5.2	1,127	6.2	1,407	1.0	280
3. Production Systems Development and Management									
3.2	Livestock Systems								
3.2.1	Animal Health								
	a) Trypanosomiasis			17.7	1,853				
		ILCA							
		ILRAD							
		ILRI		17.7	1,853	17.2	1,791	(0.5)	(62)
	b) Tick-borne diseases			14.8	2,145				
		ILCA							
		ILRAD							
		ILRI		14.8	2,145	14.7	2,139	(0.1)	(6)
3.2.2	Production Systems								
	a) Nutrition/Physiology			4.1	842				
		ILCA							
		ILRAD							
		ILRI		4.1	842	4.1	900		58
	b) Feed Resources			3.4	628				
		ILCA							
		ILRAD							
		ILRI		3.4	628	3.4	628		
	c) Livestock Production Systems			9.9	1,697				
		ILCA							
		ILRAD							
		ILRI		9.9	1,697	8.9	1,627	(1.0)	(70)
	d) Regional Initiative						1,000		1,000
		ILRI							
		Total Activity 3		49.9	7,165	48.3	8,085	(1.6)	920
4. Socio-economic, Public Policy and Public Management Research									
4.1	Economic and Social Analysis			0.5	75				
		ILCA							
		ILRAD							
		ILRI		1.5	194	1.5	194		
4.2	Policy Analysis			3.3	524				
		ILCA							
		ILRAD							
		ILRI		6.3	763	7.3	1,013	1.0	250
		Total Activity 4		7.8	967	8.8	1,207	1.0	250
Total Research Activities									
		ILCA		36.0	7,463				
		ILRAD		39.7	4,711				
		ILRI		76.7	12,174	77.6	14,100	1.8	1,926

Table 2a: Core Operations - Program and Activity Requirements (continued)
(Senior Staffyears and US\$'000)

		1994 Estimate		1995 Proposal		Change from Current Year Estimate	
		SSY	\$'000	SSY	\$'000	SSY	\$'000
B. Research Support							
	ILCA	3.0	599				
	ILRAD	4.0	1,657				
	ILRI	7.0	2,256	7.0	2,324		68
C. Institution Building							
5.1 Training and Conferences							
	ILCA	1.0	668				
	ILRAD	1.0	396				
	ILRI	2.0	1,064	2.0	614		(450)
5.2 Documentation, Publication and Dissemination of Information							
	ILCA	4.0	816				
	ILRAD	1.0	486				
	ILRI	5.0	1,302	5.0	1,302		
5.3 Organisation and Management Counselling							
	ILCA	1.0	180				
	ILRAD	1.0	180				
	ILRI	1.0	180	1.0	180		
5.4 Networks							
	ILCA	4.0	810				
	ILRAD	4.0	810				
	ILRI	4.0	810	3.0	560	(1.0)	(250)
	Total Activity 5	12.0	3,356	11.0	2,656	(1.0)	(700)
D. Research Management							
1. Administration							
	ILCA	4.0	1,278				
	ILRAD	3.0	1,377				
	ILRI	7.0	2,655	7.0	2,505		(150)
2. General Operations							
	ILCA	2.0	560				
	ILRAD	1.0	1,171				
	ILRI	3.0	1,731	3.0	1,731		
Re-organisation savings							
	ILRI			(2.0)	(350)	(2.0)	(350)
3. Depreciation							
	ILCA		1,057				
	ILRAD		1,056				
	ILRI		2,113		2,186		73
Total Administration/Operations							
	ILCA	6.0	2,895				
	ILRAD	4.0	3,604				
Total Administration/Operations including Re-organisation savings							
	ILRI	10.0	6,499	8.0	6,072	(2.0)	(427)
Sub-total Operations Program							
	ILCA	64.0	13,251				
	ILRAD	50.7	11,034				
	ILRI	104.7	24,285	103.5	25,152	(1.2)	867
E. Inflation							
	ILRI				500		500
Total Operating Program							
	ILCA		13,251				
	ILRAD		11,034				
	ILRI		24,285		25,652		1,367
F. Center Income							
	ILCA		760				
	ILRAD		200				
	ILRI		960		552		(408)
G. Required from Donors							
			23,325		25,100		1,775

Table 3a: Core Operations - Research and Research Related Activity Requirements
(Senior Staffyears and US\$'000)

		1994 Estimate		1995 Proposal		Change from Current Year Estimate			
		SSY	\$'000	SSY	\$'000	SSY	\$'000		
Research And Research Related Activities									
1. Conservation and Management of Natural Resources	1.1 Eco-system Conservation and Management		5.1	1,797					
			ILCA						
			ILRAD						
			ILRI	5.1	1,797	5.1	1,752	(45)	
	1.2 Germplasm Collection, Conservation, Characterisation, and Evaluation								
	1.2.1 Forages		3.3	1,146					
			ILCA						
			ILRAD	3.3	1,146	3.3	1,319	173	
	1.2.2 Livestock		1.2	547					
			ILCA						
		ILRAD	3.2	679					
		ILRI	4.4	1,226	5.8	1,661	1.4	435	
	Sub Total	7.7	2,372	9.1	2,880	1.4	608		
	Total Activity 1	12.8	4,189	14.2	4,732	1.4	543		
2. Germplasm Enhancement and Breeding	2.2 Livestock		5.2	1,531					
			ILCA						
			ILRAD	5.2	1,531	6.2	1,863	1.0	332
	Total Activity 2	5.2	1,531	6.2	1,863	1.0	332		
3. Production Systems Development and Management	3.2 Livestock Systems								
	3.2.1 Animal Health								
	a) Trypanosomiasis		17.7	3,542					
			ILCA						
			ILRAD	17.7	3,542	17.2	3,396	(0.5)	(146)
	b) Tick-borne diseases		14.8	4,100					
			ILCA						
			ILRAD	14.8	4,100	14.7	4,056	(0.1)	(44)
	3.2.2 Production Systems								
	a) Nutrition/Physiology		4.1	1,144					
			ILCA						
			ILRAD	4.1	1,144	4.1	1,192		48
	b) Feed Resources		3.4	853					
			ILCA						
		ILRAD	3.4	853	3.4	832		(21)	
c) Livestock Production Systems		9.9	2,305						
		ILCA							
		ILRAD	9.9	2,305	8.9	2,154	(1.0)	(151)	
		ILRI				1,000		1,000	
	d) Regional Initiative								
	Total Activity 3	49.9	11,944	48.3	12,630	(1.8)	686		
4. Socio-economic, Public Policy and Public Management Research	4.1 Economic and Social Analysis		0.5	102					
			ILCA						
			ILRAD	1.0	227				
			ILRI	1.5	329	1.5	325		(4)
	4.2 Policy Analysis		3.3	712					
			ILCA						
			ILRAD	3.0	457				
		ILRI	6.3	1,169	7.3	1,478	1.0	309	
	Total Activity 4	7.8	1,498	8.8	1,803	1.0	305		
Total Research Activities		ILCA	38.0	10,137					
		ILRAD	39.7	9,005					
		ILRI	75.7	19,142	77.5	21,028	1.8	1,886	
5. Institution Building	5.1 Training and Conferences		1.0	905					
			ILCA						
			ILRAD	1.0	757				
			ILRI	2.0	1,662	2.0	1,039		(623)
	5.2 Documentation, Publication and Dissemination of		4.0	1,108					
			ILCA						
			ILRAD	1.0	929				
			ILRI	5.0	2,037	5.0	2,003		(34)
	5.3 Organisation and Management Counselling		1.0	344					
			ILCA						
		ILRAD	1.0	344	1.0	340		(4)	
5.4 Networks		4.0	1,100						
		ILCA							
		ILRAD	4.0	1,100					
		ILRI	4.0	1,100	3.0	742	(1.0)	(358)	
	Total Activity 5	12.0	5,143	11.0	4,124	(1.0)	(1,019)		
Total Research And Research Related Activities		ILRI	87.7	24,285	88.5	25,152	0.8	867	
Inflation adjustment					500		500		
Center income			(960)		(552)		408		
Required from Donors		ILRI	23,325		25,100		1,775		

Table 3c: Research and Research - Related Activity Requirements

(Regional Distribution in %)

Activity		SSA		Asia		LAC		WANA	
		1994	1995	1994	1995	1994	1995	1994	1995
		1. Conservation and Management of Natural Resources							
1.1 Eco-system Conservation and Management	ILCA	5.55%		0.67%		0.81%		0.37%	
	ILRAD								
	ILRI	6.56%	6.22%	0.67%	0.63%	0.81%	0.77%	0.37%	0.35%
1.2 Germplasm Collection, Conservation, Characterisation, and Evaluation									
1.2.1 Forages	ILCA	3.54%		0.42%		0.52%		0.24%	
	ILRAD								
	ILRI	3.54%	3.92%	0.42%	0.47%	0.52%	0.58%	0.24%	0.26%
1.2.2 Livestock	ILCA	1.69%		0.25%		0.20%		0.11%	
	ILRAD	2.10%		0.31%		0.25%		0.14%	
	ILRI	3.79%	4.96%	0.56%	0.73%	0.45%	0.59%	0.25%	0.33%
Total Activity 1		12.88%	14.10%	1.65%	1.82%	1.79%	1.94%	0.86%	0.94%
2. Germplasm Enhancement and Breeding									
2.2 Livestock	ILCA	4.73%		0.69%		0.57%		0.32%	
	ILRAD								
	ILRI	4.73%	5.56%	0.69%	0.81%	0.57%	0.67%	0.32%	0.37%
Total Activity 2		4.73%	5.56%	0.69%	0.81%	0.57%	0.67%	0.32%	0.37%
3. Production Systems Development and Management									
3.2 Livestock Systems									
3.2.1 Animal Health									
a) Trypanosomiasis	ILCA								
	ILRAD	8.75%		2.33%		3.21%		0.29%	
	ILRI	8.75%	8.10%	2.33%	2.16%	3.21%	2.97%	0.29%	0.27%
c) Tick-borne diseases	ILCA								
	ILRAD	10.13%		2.70%		3.71%		0.34%	
	ILRI	10.13%	9.68%	2.70%	2.58%	3.71%	3.55%	0.34%	0.32%
3.2.2 Production Systems									
a) Nutrition/Physiology	ILCA	3.52%		0.52%		0.42%		0.23%	
	ILRAD								
	ILRI	3.52%	3.55%	0.52%	0.52%	0.42%	0.43%	0.23%	0.24%
b) Feed Resources	ILCA	2.63%		0.39%		0.32%		0.18%	
	ILRAD								
	ILRI	2.63%	2.48%	0.39%	0.36%	0.32%	0.30%	0.18%	0.17%
c) Livestock Production Systems	ILCA	7.12%		1.04%		0.85%		0.47%	
	ILRAD								
	ILRI	7.12%	6.43%	1.04%	0.94%	0.85%	0.77%	0.47%	0.43%
d) Regional Initiative	ILRI		0.00%		2.39%		0.80%		0.80%
Total Activity 3		32.16%	30.24%	6.98%	8.95%	8.52%	8.81%	1.51%	2.22%
4. Socio-economic, Public Policy and Public Management Research									
4.1 Economic and Social Analysis	ILCA	0.32%		0.05%		0.04%		0.02%	
	ILRAD	0.70%		0.10%		0.08%		0.05%	
	ILRI	1.02%	0.97%	0.15%	0.14%	0.12%	0.12%	0.07%	0.06%
4.2 Policy Analysis	ILCA	2.20%		0.32%		0.26%		0.15%	
	ILRAD	1.41%		0.21%		0.17%		0.09%	
	ILRI	3.61%	4.41%	0.53%	0.65%	0.43%	0.53%	0.24%	0.29%
Total Activity 4		4.63%	5.38%	0.68%	0.79%	0.55%	0.65%	0.31%	0.36%
5. Institution Building									
5.1 Training and Conferences	ILCA	2.80%		0.41%		0.34%		0.19%	
	ILRAD	2.34%		0.34%		0.28%		0.15%	
	ILRI	5.14%	3.10%	0.75%	0.45%	0.62%	0.37%	0.34%	0.21%
5.2 Documentation, Publication and Dissemination of Information	ILCA	3.42%		0.50%		0.41%		0.23%	
	ILRAD	2.87%		0.42%		0.34%		0.19%	
	ILRI	6.29%	5.97%	0.92%	0.88%	0.75%	0.72%	0.42%	0.40%
5.3 Organisation and Management Counselling/Networks	ILCA	3.40%		0.50%		0.41%		0.23%	
	ILRAD	1.06%		0.16%		0.13%		0.07%	
	ILRI	4.46%	3.23%	0.65%	0.47%	0.54%	0.39%	0.30%	0.22%
Total Activity 5		15.89%	12.30%	2.33%	1.80%	1.91%	1.48%	1.06%	0.82%
TOTAL RESEARCH RELATED ACTIVITIES		70.28%	67.67%	12.33%	14.19%	13.33%	13.53%	4.06%	4.71%

Table 4: Summary of Operating Costs by Object of Expenditure
(in US\$'000)

		1994 Estimate	1995 Proposed	Change from Current Year Estimate	
		\$'000	\$'000	\$'000	%
1. Core and Total Operations					
Personnel	ILCA	6,592			
	ILRAD	6,734			
	ILRI	13,326	13,479	153	1.1
Supplies and Services	ILCA	4,995			
	ILRAD	2,901			
	ILRI	7,896	7,870	(26)	(0.3)
Operational Travel	ILCA	606			
	ILRAD	344			
	ILRI	950	967	17	1.8
Depreciation	ILCA	1,057			
	ILRAD	1,056			
	ILRI	2,113	2,186	73	3.5
TOTAL	ILCA	13,250			
	ILRAD	11,035			
ILRI Regional Initiative			1,000	1,000	
ILRI Re-organisation savings			(350)	(350)	
TOTAL	ILRI	24,285	25,152	867	3.6

Table 5: Staff Composition

			1994 Estimate	1995 Proposal	Change from Current Year Estimate %
CORE PROGRAMS					
i. International Staff					
Research	ILCA		36.0		
	ILRAD		39.7		
	ILRI		75.7	77.5	2.4
Research Support	ILCA		3.0		
	ILRAD		4.0		
	ILRI		7.0	7.0	
Institution Building	ILCA		9.0		
	ILRAD		3.0		
	ILRI		12.0	11.0	(8.3)
Research Management	ILCA		6.0		
	ILRAD		4.0		
	ILRI		10.0	10.0	
Re-organisation saving	ILRI			(2.0)	
TOTAL	ILCA		54.0		
	ILRAD		50.7		
	ILRI		104.7	103.5	(1.1)
ii. Supervisory Staff					
Research	ILCA		26.0		
	ILRAD		21.0		
	ILRI		47.0	49.0	4.3
Research Support	ILCA		2.0		
	ILRAD		2.0		
	ILRI		4.0	4.0	
Institution Building	ILCA		9.0		
	ILRAD		4.0		
	ILRI		13.0	13.0	
Research Management	ILCA		12.0		
	ILRAD		10.0		
	ILRI		22.0	21.0	(4.5)
TOTAL	ILCA		49.0		
	ILRAD		37.0		
	ILRI		86.0	87.0	1.2
iii. Support Staff					
	ILCA		429.0		
	ILRAD		310.0		
	ILRI		739.0	739.0	
iv. Total Staff					
	ILCA		532.0		
	ILRAD		397.7		
	ILRI		929.7	929.5	

Table 6: Capital Expenditure and Assets
(in US\$'000)

I. Capital Expenditure

	1994 Estimate			1995 Proposal
	ILRAD	ILCA	ILRI	ILRI
Research Equipment	170	197	367	800
Operating Equipment	70	61	131	242
Furnishing & Office Equipment	80	284	364	487
Vehicles	80	163	243	389
Buildings		210	210	257
Infrastructure		142	142	11
Other				
	400	1,057	1,457	2,186

II. Capital Stock

Fixed Assets 1 January	9,695	9,585	19,280	18,559
Acquisitions	400	1,057	1,457	2,186
Disposals	(20)	(45)	(65)	
Depreciation for Year	(1,056)	(1,057)	(2,113)	(2,186)
Fixed Assets 31 December	9,019	9,540	18,559	18,559

Table 8: Source and Application of Funds
(US\$000)

	1994 PLEDGES ESTIMATE		
	ILCA	ILRAD	TOTAL
African Dev Bank	316	175	491
Australia	126	213	339
Austria	170		170
Belgium		752	752
Canada	627	620	1,247
Denmark	523	154	677
EC	571		571
Finland	90		90
France	165	185	350
Germany	1,240	418	1,658
IDRC	40		40
Ireland	314	149	463
Italy	82	400	482
Japan	544	803	1,347
Luxembourg		150	150
Netherlands	465	136	601
Nigeria	5		5
Non CGIAR donors	14		14
Norway	453	265	718
OPEC	25		25
Other Donors	332		332
Rockefeller Foundation	84		84
Spain		25	25
Sweden	187	380	567
Switzerland	1,381	439	1,820
United Kingdom	416	720	1,136
USAID	1,900	1,300	3,200
World Bank	2,420	2,050	4,470
Total Donations	12,490	9,334	21,824

Table 8: Source and Application of Funds continued
(US\$000)

<u>SOURCE OF FUNDS</u>			1994 ESTIMATE	1995 PROPOSED
1. Grants	Core			
		ILCA	12,490	
		ILRAD	9,334	
		ILRI	21,824	25,100
2. Centre Income				
	Investment Income			
		ILCA	260	
		ILRAD	100	
		ILRI	360	300
	Other Income			
		ILCA	500	
		ILRAD	100	
		ILRI	600	252
	Total Sources			
		ILCA	13,250	
		ILRAD	9,534	
		ILRI	22,784	25,652
<u>APPLICATION OF FUNDS</u>				
1. Operations less Depreciation				
	Core			
		ILCA	12,193	
		ILRAD	9,978	
		ILRI	22,171	22,816
		ILRI OTHER COSTS (Net)		650
	Total Operations		22,171	23,466
2. Capital Expenditure				
	Core			
		ILCA	1,057	
		ILRAD	400	
		ILRI	1,457	2,186
	Total Capital Expenditure		1,457	2,186
	Total Applications			
		ILCA	13,250	
		ILRAD	10,378	
		ILRI	23,628	25,652

Memo Items

ILCA

Operating Fund at year end
Capital Fund at year end

ILRAD

Operating Fund at year end
Capital Fund at year end

ILRI

Operating Fund at year end
Capital Fund at year end

	2,582	
	2,100	
	612	
	3,418	
	3,194	3,194
	5,518	5,518

Table 9: Statement of Financial Position
(in US\$'000)

	1994 Estimate			1995 Proposal
	ILCA	ILRAD	ILRI	ILRI
<u>Assets</u>				
<u>Current Assets</u>				
Cash & Cash Equivalents	7,248	3,600	10,848	10,848
Accounts Receivable				
Donors	860	800	1,660	1,660
Employees	66		66	66
Others	397	20	417	417
Inventories	985	450	1,435	1,435
Prepaid Expenses	334	520	854	854
Total Current Assets	9,890	5,390	15,280	15,280
<u>Fixed Assets</u>				
Property, plant & Equipment	24,469	25,466	49,935	52,121
Less: Accumulated Depreciation	(14,929)	(14,631)	(29,560)	(31,746)
Total Fixed Assets - Net	9,540	10,835	20,375	20,375
Total Assets	19,430	16,225	35,655	35,655
<u>Liabilities, Capital and Funds</u>				
<u>Current Liabilities</u>				
Accounts Payable				
Donors	733	500	1,233	1,233
Employees	280		280	280
Others	1,445	200	1,645	1,645
In - Trust Accounts	550		550	550
Accruals and Provisions	2,200	660	2,860	2,860
Total Current Liabilities	5,208	1,360	6,568	6,568
<u>Capital and Funds</u>				
Capital Invested in Fixed Assets	9,540	10,835	20,375	20,375
Capital Fund	2,100	3,418	5,518	5,518
Operating Fund	2,582	612	3,194	3,194
Total Capital and Funds	14,222	14,865	29,087	29,087
Total Liabilities, Capital and Funds	19,430	16,225	35,655	35,655

Note :-

Current Assets	9,890	5,390	15,280	15,280
Less Current Liabilities	(5,208)	(1,360)	(6,568)	(6,568)
Net Current Assets	4,682	4,030	8,712	8,712
Representing :-				
Capital Fund	2,100	3,418	5,518	5,518
Operating Fund	2,582	612	3,194	3,194
Total Funds	4,682	4,030	8,712	8,712