

CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH
TECHNICAL ADVISORY COMMITTEE AND CGIAR SECRETARIAT

Report of the
First External Programme and Management Review
of the
International Livestock Research Institute
(ILRI)

TAC SECRETARIAT
FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

This report comprises:

- (a) Extract from *Summary of Proceedings and Decisions*, CGIAR Mid-Term Meeting, 24-28 May 1999, Beijing, China
- (b) Letter from TAC Chairman and CGIAR Executive Secretary, transmitting the Report of the First External Programme and Management Review
- (c) TAC Commentary on the First External Programme and Management Review of ILRI
- (d) ILRI's response to the Report of the First External Programme and Management Review
- (e) Transmittal letter from Panel Chairman to TAC Chairman and CGIAR Executive Secretary
- (f) Report of the First External Programme and Management Review of the International Livestock Research Centre (ILRI)

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June 2000



From: The Secretariat

July 1999

CGIAR Mid-Term Meeting
May 24-28, 1999
Beijing, China

ILRI External Program and Management Review¹

At a parallel session chaired by Bongiwe Njobe-Mbuli, an *ad hoc* committee of interested CGIAR Members and other participants discussed the report of the first External Program and Management Review of ILRI as well as the Center's response and the TAC commentary. The discussion of the review report was based on a presentation of the conclusions and recommendations by Samuel Jutzi, Review Panel Chair, the Center's response by Board Chair Neville Clark and Director General Hank Fitzhugh, and the TAC commentary by TAC Chair Donald Winkelmann.

Highlights of the Committee Discussion

The *ad hoc* committee:

- Acknowledged the Review Panel's constructively critical, clear, and penetrating assessment of ILRI's accomplishments and progress since its founding in 1995, and commended ILRI's Board and Management for successfully integrating the former ILCA and ILRAD into a unified Center well positioned to contribute significantly to the CGIAR's global research agenda;
- Praised the initiation of a strategic planning process to redefine ILRI's long term vision and strategy;
- Encouraged the Center to focus its research programs on areas of high comparative advantage and those which benefit marginal farmers; the research focus should be determined in the context of current trends in livestock research and development, utilize cutting edge knowledge of natural resources management research, and more clearly address the goals of food security and poverty alleviation;
- Noted the Panel's concerns and recommendations about institutional governance, leaderships, and restructuring, and expressed satisfaction that the Center's Board and Management are responding promptly; and

¹ Extract from "Summary of Proceedings and Decisions - Report from the *Ad Hoc* Evaluation Committee, Parallel Session II", CGIAR Mid-Term Meeting 1999, Beijing, China.

- Urged ILRI to address problems regarding its role as convener of the System-wide Livestock Program and to seek full recovery of overhead costs for the Program and other restricted-funding projects.

Conclusions and Recommendations:

The *ad hoc* committee:

- Thanked the Review Panel for an outstanding report that is comprehensive, analytical, constructively critical, and strategic;
- Endorsed most of the Panel's recommendations and TAC comments;
- Commended the preliminary response by the Center Board and Management to the review report, and the follow up actions being taken, particularly regarding strategic planning for the next 10 years;
- Suggested that the ILRI management communicate with CGIAR Members and others engaged in leading livestock research to arrive at more specific answers on strategic and program questions related to its research focus;
- Recommended that ILRI's Board and Management prepare a brief substantive report for ICW99 on progress in implementing the recommendations of the Review Panel and *ad hoc* committee;
- Encouraged CGIAR Members to strongly support ILRI's research work; and
- Suggested that the CGIAR system draw lessons from ILRI's experience in consolidating two Centers into one and Board-Management relations, including the use of "joint board-management *ad hoc* committees" on strategic and high priority issues.

Decision: The Group accepted the External Program and Management Review report for ILRI, and endorsed the ad hoc committee's conclusions and recommendations.

Consultative Group On International Agricultural Research (CGIAR)

TECHNICAL ADVISORY COMMITTEE

Donald Winkelmann, Chairman

12 April, 1999

Dear Mr. Serageldin,

It is our pleasure to submit to you the report of the First External Review of ILRI which was conducted recently by a Panel chaired by Dr. Samuel Jutzi. We also attach ILRI's response to the Review report and the TAC commentary, which summarizes the Committee's reactions to the Panel's report and ILRI's response.

The Panel has conducted a constructively critical and strategically oriented review of the Centre, and has done so with the intent of helping the CGIAR set a tropical animal science research agenda consistent with the growing importance of the livestock sector to the future human food supply in developing countries. We agree with the Panel's observation that ILRI management, board, and staff have done notably well in unifying ILCA and ILRAD.

TAC concurs with the Panel's view that ILRI is well placed to carry out strategic research, especially in the areas of biotechnology and genomics applied to livestock, feed resources and animal nutrition, and integrated improvement of tropical animal health and production. As well, it strongly endorses the Panel's concept of a global animal science research agenda that contributes to the CGIAR's goals of poverty alleviation and environmental protection. Given the rapidity of changes in livestock science, technology and markets, we welcome the Panel's recommendation that ILRI give immediate attention to revising its strategic plan, including its programme structure, priority setting process, and partnership arrangements, in order to be better positioned to meet future challenges in the sector.

The Group should commend ILRI's Board and management for the progress which has been made since ILRI's foundation. We note, in particular, the Board's effectiveness in ensuring financial accountability and for its attention to Board procedures. As well, in a fast moving world, we note the need for a clearer delineation of responsibility for Board and management functions.

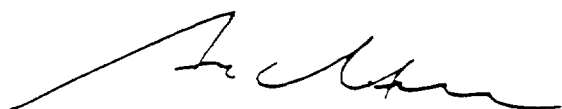
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Mr. Ismail Serageldin
CGIAR Chair
World Bank
1818 H Street, NW
Washington, DC 20433
USA.

TAC notes the Panel's commendations about the chances that ILRI's output has significant potential for impact. We have no doubt that ILRI has considerable potential to be a world leader in livestock research and trust that, in implementing the Panel's recommendations, it will continue to warrant the strong support of the CGIAR.

We recommend that the Group endorse this review report. TAC plans to interact with ILRI during the implementation of the review's key recommendations.

Yours sincerely,



Alexander von der Osten
Executive Secretary, CGIAR



Donald L. Winkelmann
Chair, TAC

TAC Commentary on the First EPMR of ILRI

TAC expresses its appreciation to Dr. Samuel Jutzi and his Panel for an outstanding report on the First External Programme and Management Review of ILRI. The report is highly analytical, constructively critical, and strategic in nature. It points out the strengths and weaknesses of the Centre in a balanced way, using a directness of style which is not found commonly in reports of this kind but which greatly enhances its value to the Centre and to TAC. The report covers ILRI's activities fully, except in the area of social science research which in TAC's view was not considered thoroughly. It contains fourteen recommendations with additional important suggestions throughout the text. ILRI agrees with most of the recommendations and has started to implement a number of them. TAC believes that the Institute's written response does not adequately address the issues raised by the Panel. While the response was supplemented by discussion at TAC 76, the Committee's commentary rests largely on ILRI's formal response. TAC endorses most of the recommendations of the Panel and offers the following commentary, which was prepared with inputs from the CGIAR Secretariat, to supplement the Panel's report.

Future Perspective on Tropical Animal Agricultural Research

The report is prefaced by a statement on the issues to be considered in setting a tropical animal science research agenda which TAC considers to be excellent. The role of animal agriculture in human food supplies for developing countries is likely to grow substantially over the next two decades. The demand for meat and milk in developing countries is projected to more than double. The food functions of livestock are becoming ever more important while the non-food functions, such as draught, manure, and asset creation, are diminishing in importance. The structure of animal production is also changing with industrial and mixed farming systems expanding, along with the occurrence of rapid technological shifts to intensive and more specialised systems. These shifts lead to increasing environmental concerns. TAC strongly endorses the Panel's view that a global animal science research agenda has a vital contribution to make towards the CGIAR's goals of poverty alleviation and natural resource protection.

TAC also endorses the Panel's view that in the planning of future livestock research greater emphasis needs to be put on market-driven elements and to linking them effectively to the relevant collaborative framework on the basis of comparative advantage. TAC agrees with the Panel that ILRI is best placed to carry out strategic research dimensions in the supply of products, methodologies, and technologies in the areas of biotechnology and genomics applied to livestock and livestock diseases, and to prepare for the post genomic era in livestock research. Strategic research on feed resources and animal nutrition is an equally important element of this international agenda. As argued by the Panel, ILRI is best positioned to address the improvement of tropical animal health and production in an integrated manner.

ILRI's Strategy and Priorities

ILRI was established in 1995 following a recommendation from the Group to expand the focus of CGIAR livestock research from sub-Saharan Africa (SSA) to a global agenda. It was also recognised that progress towards CGIAR goals depended heavily on exploiting the

synergies between animal health and animal production. TAC recognises the considerable difficulties which were overcome in unifying ILCA and ILRAD, two Centres with widely different cultures, and commends the Board and management specifically for the progress which has been made since ILRI's foundation.

ILRI has not updated the strategic plan that was prepared prior to its establishment by the CGIAR Working Group under the auspices of the Rockefeller Foundation. The Institute has held many valuable consultations with its stakeholders and much additional information is now available on which the planning of international livestock research can be based. The dynamics of changes in tropical animal production and science, to which reference has been made, also make it important to renew the Centre's strategy at this time.

TAC therefore strongly endorses the Panel's recommendation that ILRI should give immediate attention to revising its strategic plan, showing how it expects to develop its programmes. An explicit priority setting process is needed, with clear links to resource allocation. This will be an essential aid to the Board and management in their response to the Panel's recommendations of improving and maintaining the focus of the scientific agenda, especially in the face of resource fluctuations. TAC expects ILRI to benefit considerably in this process from the results of the *ex ante* impact assessment studies which the Centre has already carried out.

The Panel raises again the question of whether non-ruminants should be considered for inclusion in the Centre's work. TAC recommends that ILRI explore this question, especially given the potential of pigs and poultry to draw poor farmers in Asia into a market economy. Careful consideration should be given, however, to possible alternative sources of the relevant research. In any case, ILRI should consider whether there may be applications of their work in ruminants which are relevant to smallholder pigs and poultry. TAC will welcome further interaction on this matter as the Centre prepares its strategic plan. TAC also urges ILRI to specify clearly in the strategic plan the proposed role of social science research, in view of the importance of socio-cultural research variables in animal husbandry.

Scientific Quality

The Panel applied a systematic scoring procedure in their evaluation of ILRI's science. Although nearly all of the projects were rated as good or better, TAC is concerned, however, that nearly one third of the projects were found unsatisfactory because of quality or because of output and that nearly a quarter were not considered well focused. Moreover, TAC agrees with the Panel that excellent, rather than 'good' or 'very good' standards must be expected from an international centre.

TAC is concerned that there is still weakness in the critical areas of animal nutrition and part of the systems work, and that there is a virtual absence of sociological research. TAC discussions emphasised that at the core of crop-livestock systems are the farmers-producers and welcomed ILRI's commitment to incorporate sociological capacity soon among its research staff.

Turning to related topics, the Panel noted that ILRI has an excellent scientific reputation in several areas (as for example in genetics and disease resistance), and comments favourably on its publication record. On the other hand, TAC is concerned about the fragility of output observed by the Panel in some projects, due to lack of critical mass. The Committee urges

the Centre to develop stronger mechanisms to ensure scientific quality and to make much greater use of well-focused centre-commissioned external reviews (CCERs) for the purpose of assessing science quality. TAC recognises the short supply of world class scientists in many areas critical to ILRI's agenda and urges the Centre to explore creative solutions to attracting and retaining outstanding staff.

TAC is grateful to the Panel for its clear analysis of the progress made by ILRI in its vaccine research. It is impressed by the progress made in developing a vaccine for east coast fever even though the task has proven to be far more difficult and time-consuming than anticipated until recently. With respect to a vaccine for trypanosomiasis, TAC notes the low chances of success of the research and would encourage the Centre to seriously consider whether further investments in this area are warranted.

Organizational Structure

The Panel makes several recommendations about programme integration and institutional organisation. TAC sees that the extent to which these are implemented by ILRI will depend on the outcome of the strategic plan. However, TAC would have reservation about the suggestions to merge Projects 11 and 12, doubts that Project 19 could maintain its momentum were several others project attached to it, and wonders about the viability of Projects 13 through 18 in the absence of a strong market orientation in their work.

Board and Management

The Committee commends ILRI's leadership for a successful integration of two very disparate institutions and for putting in place effective financial, human resources, and other administrative systems. The Board has performed well in fulfilling its fiduciary responsibility, in providing overall financial oversight, and in developing well thought out Board procedures. The Committee is concerned, however, about the blurred lines of responsibility between the Board and management, the lack of progress on the development of a strategy and priority setting methods, as well as the problem of delegation of authority within the Centre. TAC considers that ILRI's research leadership team needs to be strengthened and appreciates the reasons for the Panel's suggestion about the appointment of a Deputy Director General in this regard. The present Board has outstanding expertise in programmatic areas and TAC looks forward to seeing this fully reflected as the Board carries out its policy setting and oversight responsibilities in the context of the ongoing strategic planning.

The Committee commends ILRI staff for its commitment and competence and believes that there would be considerable pay off from the development of a shared vision of the Institute's future direction. The Committee also considers that there would be greater pay off from effectively managing resources at hand, rather than trying to obtain additional resources. TAC also urges the ILRI Board and management to carefully consider the future of its Ethiopian facilities in line with the Panel's recommendations.

Accomplishments and Impact

TAC commends ILRI for the contributions it has made to science and for producing significant output with potential impact. TAC also commends ILRI for its strong capacity in

ex ante impact assessment. The Committee was particularly pleased to note that there are some areas in which ILRI is seen potentially as world leader and about the very favourable views held by NARS of its work, particularly its activities in training, networks and information technology. TAC encourages ILRI, however, to place much greater emphasis on the research impacts of its collaboration rather than on institution building per se. The Committee is satisfied that ILRI has the capacity for effective impact assessment. While TAC is also satisfied that many of its current programmes have good potential for impact, the Committee is concerned about the limited amount of information available on ex post impact assessment. TAC would encourage ILRI to strengthen its efforts in providing evidence of impact obtained from past activities.

With respect to the Systemwide Livestock Programme, TAC would encourage ILRI to develop terms of reference for its convening role, to discuss these with its partners, and to report back to TAC 77. TAC will also revisit the matter in the context of its own ongoing review of Systemwide programmes. The Centre has always followed CGIAR norms with respect to reporting on Systemwide programmes, so TAC does not understand the Panel's recommendation (11 iii) in this regard.

Overall Conclusion

TAC commends the Panel for an outstanding report that identifies areas of significant strength and weakness at ILRI. TAC is in no doubt that ILRI has considerable potential to develop itself as an international centre and as a world leader in livestock research. In order to achieve this potential, ILRI will need to give immediate attention to strengthening its leadership and to the development of a strategic plan. TAC also urges the Centre to give serious attention and follow up to the remainder of the Panel's recommendations. The Committee will carefully monitor the situation and developments and expects ILRI to present a progress report on its follow up to each of the recommendations at TAC 77 in September 1999. As a part of this, TAC expects to interact with ILRI on the substance of its emerging strategic plan at TAC 77, looks forward to seeing the entire plan by the end of 1999, and to seeing its full implementation in the Medium-Term Plan submitted for consideration by TAC in March 2000. The Committee will then decide whether to recommend any additional actions.



International Livestock Research Institute

Consultative Group on International Agricultural Research

Nairobi, Kenya

DG99/Lett/035

16th March, 1999

Dr. Donald L. Winkelmann
TAC Chair,
355 East Palace Avenue,
Santa Fe, NM 87501,
U.S.A.

Mr. Alexander von der Osten,
Executive Secretary,
CGIAR Secretariat,
The World Bank
1818 H Street, N.W.
Washington, D.C. 20433
U.S.A.

Dear Dr. Winkelmann and Mr. von der Osten,

Subject: First External Programme and Management Review of the International Livestock Research Institute

On behalf of ILRI Board, Management and Staff, we express our appreciation to Prof. Samuel Jutzi and the members of the EPMR Panel for a positive report and their constructive recommendations. We appreciate the Panel's strong support for international livestock research to help meet the tremendous increase in demand for meat and milk in developing countries over the next two decades.

The Panel noted that after four years, ILRI has made significant progress in re-orienting the resources of two institutes, which had both focussed on sub-Saharan Africa, to serve our expanded global mandate. We appreciate the Panel's recognition that this significant progress has been achieved despite an uncertain financial environment. Fortunately, funding for ILRI has increased by more than ten percent from 1998 to 1999. With the Panel's endorsement of ILRI's programmes, we are now optimistic that the TAC recommended levels of funding will be fully realised in the foreseeable future.

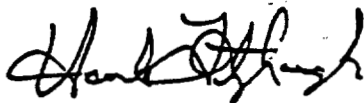
As we indicate in ILRI's response to the Panel's Report and Recommendations, we particularly value the Panel's critical evaluations of ILRI's programme and management. Their constructive criticism identifies specific areas requiring improvement. ILRI's Board and senior management have already agreed to steps to effect the agreed needs for improvement.

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First External Programme and Management Review of the International Livestock
Research Institute

ILRI's response to the overarching issues addressed by the Panel and, specifically, to the fourteen recommendations follow. In addition, ILRI will carefully consider all the Panel's comments and suggestions in the course of developing our new strategy and the Medium Term Plan (2001-2003) over the next nine months.

Sincerely,



Hank Fitzhugh
Director General



Neville Clarke
Chair, ILRI Board of Trustees

ILRI's Response to the First External Programme and Management Review

The Review

ILRI's Board and Management express their appreciation to the Review Panel for a positive, constructively critical, and useful analysis of ILRI after its first four years. As pointed out in the Panel's report, this review finds ILRI at a cross-roads. The Institute has established its corporate identity and is in the process of a major revision of its strategy and medium term plan. Therefore, the findings and recommendations of the report are most timely. The report not only provides clear guidance to the Institute, but the rigor and quality of the review add substantial credibility to the Panel's positive recommendations about the future of the Institute.

Three major findings of the panel are of paramount importance for the future CGIAR agenda:

- **There is a rapidly growing demand for livestock and livestock products in developing countries**
- **Research is critical to meet future demands for livestock products and in building assets derived from livestock for small farmers.**
- **ILRI, as a newly formed global Institute, has the capacity and position in the CGIAR to be the pivotal organization for conducting priority livestock research and facilitating animal agriculture research among Centres and collaborators in NARS and ARIs.**

Board and Management Response

ILRI recognizes that key concerns of the Panel are the needs to better articulate our vision, improve programme focus, and state more clearly how we link goals and priorities with expected resources. We have learned from the perceptions of the Panel that our working vision has not been adequately presented. We also acknowledge the need to revise and update ILRI's strategy. The Institute has initiated a comprehensive programme review, demand assessment, and development of a consensus based strategy, which will reflect the changing internal and external environments in which ILRI operates. This new strategy will be the basis for the major revision of the medium term plan (2001-2003) which will take ILRI beyond the cross roads and into the next millennium.

Overarching Factors in ILRI's Response to the Report

ILRI has agreed or agreed in principle to most of the specific recommendations. Action has started on a number of the recommendations.

As one of the actions taken, Board and Management initiated the process of revising the ILRI strategy by the **Joint Board-Management Ad Hoc Committee on Strategic Principles**. This committee developed a report which was discussed, finalized and adopted by the Board at its March, 1999 meeting. This report is the point of departure for developing the new strategy and MTP (2001-2003).

The Panel reported a number of overarching findings that apply more broadly than the specific recommendations. In this section, we summarize ILRI's response to these broader issues. Our response draws heavily on the statement of strategic principles.

- **Critical Mass and Partnerships:** In ILRI's revised strategy, we will draw on the findings of the Panel and continue to emphasize building the capability and capacity to achieve critical mass, especially in regional research, through partnerships. We will leverage our limited resource by engaging other centres, NARS and ARIs with common interests and complementary resources.
- **Brokering Role:** In keeping with the findings of the System Review and those of the Panel, ILRI will increase its role in contributing to bridging the strategic research done in ARIs and the applied research and development done by NARS. This will be achieved through more effective partnerships, capacity building, developing information products, and facilitating linkages. ILRI will more effectively undertake its convener role for livestock research in the System, using the Systemwide Livestock Programme for promoting complementary livestock research among the centres, and their partners in ecoregional programmes.
- **Global and Regional Balance:** To address this concern of the Panel, ILRI will place increased emphasis on regionally relevant research that includes developing applications for its globally relevant products in the context of the different agroecological and socio-economic conditions around the world. This balanced portfolio of globally and regionally relevant research will be designed to increase the impacts from livestock research.
- **Environment and Natural Resource Management:** In concurrence with the Panel, our strategy and MTP will increase emphasis on research to improve livestock productivity in an environmentally sustainable manner. Our natural resource management research will address livestock related issues through ecoregional consortia and the systemwide programmes with other centres and their national partners.

- **Programme Structure:** Panel recommendations for restructuring ILRI's programmes are generally agreed. We will address these in the major revision of strategy and MTP which will be developed between March and December 1999.
- **The Unfunded Agenda:** ILRI, like other centres, is increasingly constrained by limited funds, and by the decreasing portion of fungible funding that can be used for initiating exploratory research and supporting longer term upstream research. The EPMR clearly and strongly endorses ILRI's biotechnology programme, as does ILRI's Board and Management. We believe the positive report of the Panel will be persuasive to donors and useful in ILRI's advocacy for the "unfunded agenda".
- **Maintaining Focus in a Restricted Funding Environment:** With the growing dependence on restricted funding, all CGIAR centres are increasingly challenged to maintain a tight focus on their goals and priorities. This is a systemwide problem which was highlighted by the recent System Review. Nevertheless, ILRI's Management and Board are determined to ensure that short term project funding does not divert core resources and blur focus on the priority research for which ILRI has comparative advantage.
- **Leadership and Critical Vacancies:** Leadership and scientific quality are key to the success of the Institute. Recognizing the challenges of attracting outstanding scientists to work and live in developing countries, ILRI is committed to filling key vacancies with excellent scientists and leaders to ensure that ILRI's full potential is achieved in serving the CGIAR goals for poverty alleviation, food security and environmental protection.

Responses to specific recommendations

CHAPTER 3 - STRATEGY, PRIORITIES AND PLANNING

1. *Believing that ILRI has identified a potentially powerful concept in building essential areas of science planning and management, the Panel **recommends** that ILRI define and further develop its 'platforms of essential capacity', including such concepts as core competence in key research areas.*

Agreed: We appreciate the positive comments on the establishment of platforms of capacity and core competence in priority areas where ILRI has comparative advantage compared to alternative suppliers. ILRI will develop this concept further as part of the strategic and medium-term planning process during 1999 to improve focus, scientific quality and potential for impact.

2. *Considering the need to orient livestock research more closely towards the requirements of rapidly changing animal agriculture in developing countries, and the need to define and operationalize ILRI's global mandate more precisely, the Panel **recommends** that ILRI revisits its vision, strategy, and priorities and redesign its planning processes to position the Institute compellingly at the core of the international animal agriculture research agenda.*

Agreed: The assessment and suggestions of the Panel provide valuable input to improving the planning process. Review of ILRI's research agenda and vision, revision of the strategic plan and development of the MTP 2001-2003 are major activities for ILRI in 1999. ILRI has taken steps to strengthen its priority setting and planning processes.

CHAPTER 4 - GOVERNANCE, LEADERSHIP AND ORGANIZATIONAL CULTURE

3. *Since policies established by the Board over the years, particularly in the programme area, have not been made widely known, the Panel **recommends** that past policies be retrieved from the records in such a way that they are made available for references needed both by current and newly recruited staff, and that those approved in the future be similarly known.*

Agreed: Action has been taken to implement this recommendation. A Policy Decisions Document in electronic form (as a key component of the Operations Manual), that is fully searchable by topic and key words, will be accessible through the internal network. New staff will be informed on policies through a summary brochure as part of their orientation kit.

4. *Because the line between the responsibilities of the Board and Management appears to be inappropriately drawn at ILRI, the Panel **recommends** that the Board clearly focus on its policy formulation and oversight functions, and establish a sharper distinction between its responsibilities and those of Management.*

Partly

Agreed: Board and Management agree to the recommendation to review and re-state the principles that define the responsibilities of the Board and Management in the definition and implementation of policy decisions. We are committed to a strong and functional partnership between Board and Management and believe this is reflected clearly in our deliberations and actions.

Board-Management relationships were the subject of comprehensive discussion during our retreat in 1997. One basis for deliberation was the article entitled "The New Work of the Nonprofit Board." The following table from the report illustrates key points.

OLD WORK	NEW WORK
Management defines problems, assesses options, and proposes solutions. Board listens, learns, approves, and monitors	Board and Management discover issues that matter, mutually determine the agenda, and solve problems together
Board sets policy, which management implements. Respective territories are sharply define; there is little or no border traffic. Domains are decided by organization chart	Board and Management both set policy and implement it. Lines are blurred, borders open. Domains are decided by nature of the issue at hand
Structure of standing committees parallels administrative functions. Premium is on permanent structure, established routines. Members occur functional niches. Board maintains busywork	Structure of Board mirrors institutions strategic priorities. Premium is on flexibility, ad hoc arrangements. Members occupy functional intersection. Board creates centers of action.
Board meetings are process driven. Protocol doesn't vary. Function follows form. Emphasis is on transmission of information and reports.	Board meetings are goal driven. Protocol varies with circumstances. Form follow function. Emphasis is on participation and action.
Board is a collection of stars. It recruits people with an eye to expertise and status. The CEO cultivates individual relationships and exploits each trustee's talents.	Board is a constellation. It recruits team members with an eye to personality and overall chemistry. Board cultivates group norms and collective capabilities of trustees.

Ref: Taylor, Chait, and Holland, Harvard Business Review, September-October, 1996.

Board and Management adopted some, but not all aspects of the “new work.” For example, Joint Board-Management Ad Hoc Committees on contemporary topics of high relevance have been established. The Panel noted the utility of these committees. However, careful distinction has been made between the separate roles of Board for governance and of Management for implementation.

Response from the Board of Trustees

With respect to the Director General, the Panel noted areas of exemplary performance as well as specific concerns. The annual evaluations done by the Executive Committee as well as the results of a full Board discussion at the September 1998 meeting reaffirm the Board's belief that

the Director General, *on balance*, is providing the overall leadership of the Institute needed to achieve the goals of integration noted in the Panel's report, to stabilize, and extend its operations to meet the global mandate.

The Board believes that the establishment of the position of Deputy Director General, as recommended in the next Chapter by the Panel, will strengthen leadership and add complementary skills to provide ILRI the senior management required to ensure the continuing progress of the Institute. The Board has approved the development of the position description, the selection process, the new structure, and the factors that underpin success of the new structure.

CHAPTER 5 - INSTITUTIONAL STRUCTURE AND MANAGEMENT

5. *To ensure strong scientific leadership and incisive decision-making, the Panel **recommends** that ILRI modify its organisational structure to include the following elements (see Figure 5.2):*

i) *A new office of Deputy Director General (Research) to act in the absence of the Director General, oversee ILRI's research agenda, take a primary role in planning and priority setting exercises, promote inter-programme collaboration, and provide independent analysis of the resource needs of research programmes. The DDG (Research) would also oversee the Research Support Units.*

Agreed: **ILRI Management and Board fully concur that the organizational structure should enable strong scientific leadership and decisive decision making. Recruitment for a Deputy Director General responsible for programme will be initiated with immediate effect. The terms of reference for the position were discussed and approved by the Board.**

ii) *The current research and research-related agenda consolidated into five programmes as follows: Animal Genetics and Genomics; Animal Disease Control; System Science, Impact, and Policy Analysis; Production Systems and Animal Nutrition; and International Co-operation.*

Agreed: **The concept of a consolidated project and programme structure is agreed in principle, although the final configuration may differ from that presented by the Panel depending on the outcome of the strategic planning process in 1999. Options for programme and organizational structure will be presented for Board approval in September 1999.**

iii) *The programmes consisting of projects as at present, though with a different configuration (as proposed in Chapters 6, 7, and 8).*

Agreed: Plans for those projects which will be continued, as well as for new initiatives, will be evaluated in the strategic planning process leading to the development of the MTP (2001-2003) as stated above.

iv) *One unit -- the Office of External Relations -- in a staff relationship to the Director General to continue co-ordinating the Institute's fundraising and public awareness activities.*

Agreed.

v) *No change in the responsibilities of the Administration department, which would retain responsibility for finance, human resources management, information technology services, and administration of both Nairobi and Addis campuses.*

Agreed.

CHAPTER 6 - BIOSCIENCES

6. *To ensure research quality and productivity by having project co-ordinators and their research teams work together on a daily basis and thereby achieve cross-fertilization of ideas, catalyze critical thinking, and design cutting-edge research and research proposals, the Panel **recommends** that Project 1 (Characterization, conservation and use of animal genetic resources) and Project 2 (Development of disease resistant livestock) be managed at the Nairobi campus.*

Agreed: We share the Panel's view of the importance and value of the animal genetics research, and agree with the recommendation to manage Projects 1 and 2 together. We will manage this research as one Project, under a Project Coordinator based in Nairobi. This action is consistent with the Panel's recommendation to consolidate animal genetics and genomics (Chapter 5).

7. *Because the slow pace and past unrealistic timescales have led to a lack of credibility in the area of ILRI vaccine research, the Panel **recommends** that the research on vaccine development (ECF and Trypanosomosis) be critically reviewed with the aim of clearly defining a strategy and programme for developing further antigens for the ECF vaccine and evaluating whether a vaccine against trypanosomes is a viable prospect.*

Agreed: We accept the Panel's recommendation to define a more strategic approach to antigen development for the ECF vaccine, and will strengthen links with ARIs in areas where ILRI lacks comparative advantage. This approach is

also in accordance with the Panel's support for maintaining a critical mass of scientific expertise in biotechnology and knowledge of the parasite genome.

We note the Panel's concern about the slow pace of vaccine research. The results from current field trials with the p67 sporozoite vaccine against ECF, and current laboratory trials with congopain to validate its efficacy in reducing the pathogenic effects of trypanosomosis in cattle, will inform critical decisions about future research in these areas, and the possible involvement of the commercial sector in vaccine production.

8. *To integrate a systematic global evaluation of forages, crop residues and other feeds with the nutritional evaluation of dietary options to increase animal productivity and net economic returns, the Panel **recommends** merging Projects 8, 9 and 10 (Feed utilisation improvement for improving livestock productivity; Rumen microbiology for feed utilisation enhancement; and Characterisation and conservation of forage genetic resources) into a cohesive Ruminant Nutrition Management Project.*

Agreed: We accept this recommendation and have taken steps to merge the projects. Terms of Reference for a Project Co-ordinator to lead this area have been prepared. We will review which elements of these projects constitute laboratory-based and which constitute field-based ecoregional research. This analysis will guide decisions about which elements are managed within the strategic biological research projects and which are more appropriate to the ecoregional systems projects. The linking of the strategic components to regional applications and utilisation will be emphasised to ensure effective delivery of new technologies and products to NARES.

CHAPTER 7 - SUSTAINABLE PRODUCTION SYSTEMS PROGRAMME

9. *To stimulate income growth and food security for farm families, to help alleviate poverty, and to conserve natural resources, the Panel **recommends** that ILRI strategically orient the production systems research programme, and establish an ecoregional or global consortium for market-oriented crop-livestock systems.*

To accomplish this:

- i) *Project 19 (Market-oriented smallholder dairy systems) should be broadened beyond dairy to constitute a transregional or global research project that is especially aimed at enhancing economic growth of rural households by developing more profitable and sustainable market-oriented crop-livestock systems.*

Partly

Agreed: We are increasing emphasis on market-oriented systems which provide for asset building and income generation for resource-poor smallholder farmers. This research on market-oriented systems directly addresses the CGIAR goals of poverty alleviation, building assets, improving livelihoods of rural households and helping to meet the expanding demand for livestock products, especially in urban areas of developing countries.

The market-oriented smallholder dairy project will provide a model for research on other market-oriented crop-livestock systems projects. This project will continue to work on transregional analysis of smallholder dairy systems in selected ecoregions of the world. However, any expansion of the systems covered by project 19 will be critically evaluated because we have concerns that diluting the focus on smallholder dairy will reduce the commended effectiveness of this project.

- ii) *Scientific staff in Project 13 (Crop-livestock systems in the highlands of SSA and Asia) be re-assigned, possibly to Project 19, to increase the critical mass of scientists focusing on transregional research objectives and market-oriented systems.*

Partly

Agreed: The research in Project 13 has substantially changed to integrated natural resource management. This research is strategic in nature, and links natural resources, livestock production, poverty alleviation, human nutrition and health. Methods, experience and results will have transregional relevance. This research links African Highlands research with livestock elements of the CIP-convened Global Mountain Programme, including research in the Andes and that led by ICIMOD in the Hindu Kush Himalayas.

- iii) *The expertise of Project 14 (Crop-livestock systems in subhumid SSA and Asia) and Project 15 (Crop-livestock systems in semi-arid zones of SSA and Asia) could be consolidated to form one project having more critical mass to focus on market-oriented systems in the subhumid zone, co-ordinated with Project 19, although not restricted to dairy.*

Agreed.

- iv) *If Project 16 (Crop-livestock systems in fragile environments in LAC) is to be continued, it should become part of the transregional smallholder livestock systems effort of the re-designed Project 19 with a full-time ILRI staff member.*

Partly

Agreed:

The project has two components, one linked with the CIAT-led Tropileche consortium and the other with the CIP-led CONDESAN. Two ILRI IRS are engaged in these projects through joint appointments with CIAT and CIP. They leverage substantial resources and establish critical mass through partnerships with their host IARCs and NARS. In response to the Panel's concerns, the ILRI contributions to the Tropileche consortium will be integrated with the market-oriented dairy research in Project 19 and ILRI's livestock research in CONDESAN will be integrated with the highlands research in Project 13.

CHAPTER 8 - RESEARCH ON IMPACT ASSESSMENT AND POLICY ANALYSIS

10. *To enable the necessary integration of impact assessment and policy research, better orient the Institute's biophysical and production systems research (and its priorities), and provide a firm base for delivering outputs and generating impact, the Panel **recommends** that Projects 11 (Systems Analysis and Impact Assessment) and 12 (Policy Analysis) be merged, with all staff operating at ILRI's headquarters in Nairobi.*

Partly

Agreed:

We agree that closer linkages between projects 11 and 12 will strengthen the systems and policy research. However, we do not agree with the merger of these projects and basing all staff in Nairobi.

ILRI currently has fifteen internationally recruited economists on staff. Of these, ten are members of interdisciplinary ecoregional teams with dual research responsibilities for microeconomic analysis of constraints to livestock production and marketing as well as contributions to macroeconomic analysis supporting policy research by ILRI, IFPRI and other partners.

This link between primary data and policy analysis was cited as a major comparative advantage for ILRI in the 1996 CCER of livestock policy research. Consolidating all staff engaged in policy analysis at headquarters in Kenya would disable the interdisciplinary teams working outside Kenya and lose the benefits from linking micro- and macro-economic research.

CHAPTER 9 - STRENGTHENING PARTNERSHIPS WITH NARS (SPAN)

ILRI welcomes the positive assessment and encouragement given by the Panel to its work in strengthening partnerships with NARS. We agree the need to continue defining the role and contribution of training, information and networking to ILRI's global agenda. We also value the

Panel's encouragement to establish new partnerships, including with ISNAR, to strengthen NARS livestock research. We highlight a number of issues from the Panel Report.

- *An African Capacity Building Initiative should be further developed (see chapter 3).* The African Capacity Building Initiative (ACBI) was recommended by the CGIAR Systems Review. Consultations are on-going with stakeholders in sub-Saharan Africa. If there is support from NARS and sub-regional organizations for this inter-centre initiative, we will actively pursue the development of ACBI with NARS in sub-Saharan Africa.
- *NARS rate ILRI training highly, and as one of the major contributions by the Institute in building their research capacity.* ILRI will continue to provide targeted training and training resources to strengthen livestock R&D capacity of its NARS partners, and their capacity to deliver their own training. As the Panel notes, NARS livestock capacity remains relatively weak compared to the capacity for crops research.
- *The NARS-ILRI networks enhance regional collaboration for livestock R&D.* The networks in sub-Saharan Africa will continue to fulfil this role. We note the Panel's **suggestion** that ILRI programmes and projects together with regional priorities should provide the basis for collaboration with the networks. However, the network priorities are set by the sub-regional organizations of NARS; these priorities will continue to influence ILRI's research agenda, and thus strengthen the links between ILRI and research in the networks.
- *ILRI is the core world knowledge source on African animal agriculture research and its information services are valued by NARS.* The Institute is using its information services as the base for the development of a global livestock information system through partnerships with national and international information services, including FAO.
- *ILRI's new information strategy convincingly and strategically positions the Institute in the context of its global livestock research agenda.* The Institute will continue to use its information services to establish ILRI as a knowledge broker for tropical animal agriculture, one important mechanism for extending ILRI's programme outputs.

CHAPTER 10 - EXTERNAL RELATIONS AND PARTNERSHIPS

11. *To address concerns regarding ILRI's interpretation of the convenor role in managing system-wide programmes of the CGIAR, the Panel **recommends** that ILRI*
 - i) *redefine its role in the System-wide Livestock Programme (SLP) to conform with the TAC-recommended function of a system-wide programme convenor,*

Partly

Agreed: We welcome TAC guidance on the function of a system-wide programme convener. The nature of the convening function varies for different system-wide programmes. TAC is currently evaluating the experiences of the inter-Centre programmes established since 1994.

- ii) *withdraw those parts of its own research programme from the SLP over which the Inter-Centre Livestock Programme Group has no jurisdiction, thus enabling the entire portfolio of the Programme to be guided by procedures agreed in the SLP, and*

Partly

Agreed: We agree to the value of consensus support by the Livestock Programme Group (LPG) for activities funded directly by the SLP. However, an important objective of the SLP is to build on the core activities of participating Centres. The SLP provides incremental funding to support additional collaborative research on livestock feeds and NRM by Centres and their national partners. This collaboration adds value to the core research done by collaborating Centres, including ILRI. The LPG does not assume jurisdiction over the core activities of any of the collaborating Centres.

- iii) *refrain from reporting the SLP as part of ILRI's research portfolio.*

Not

Agreed: ILRI follows TAC and CGIAR guidelines for reporting system-wide programmes as part of the Institute's portfolio.

CHAPTER 11 - CROSS-CUTTING ISSUES

12. *To maintain and enhance ILRI's scientific reputation, the Panel **recommends** that the Institute develop and use explicit mechanisms for ensuring scientific quality and the effectiveness and utility of its outputs.*

Agreed. ILRI was pleased with the assessment of our research against the Panel's criteria of good science. The overall quality and output of 88% of ILRI's projects were assessed as good or better. ILRI will improve and strengthen existing mechanisms to ensure relevant quality science is brought to bear on priority problems identified with partners and stakeholders, including expanded use of logical frameworks, CCERs, impact assessment, peer review, annual workplans and progress reports with clear milestones, and publication review.

ILRI is pleased to note the endorsement of the Panel for its approach to intellectual property, animal welfare, biosafety and bioethics issues.

CHAPTER 12 - ADMINISTRATION

13. *Because ILRI does not have an adequately defined and transparent system with which to classify internationally recruited staff (IRS), determine salaries, and ensure equity in compensation, the Panel **recommends** that:*

- i) the categories of scientist, programme specialist, and administrator be expanded to differentiate positions with differing levels of responsibility, authority, knowledge, and skills;*
- ii) a salary range for each IRS level be developed and applied in all cases;*
- iii) where, in infrequent instances, market values for particular skills necessitate payment of a salary higher than that of equivalent positions, a market supplement be given to attract and retain suitable candidates; and*
- iv) information on the policies and procedures of the classification and compensation system be provided to all IRS staff.*

Agreed: Categories for IRS will be expanded to differentiate positions with differing levels of responsibility, authority, knowledge and skills with a salary range for each category. We acknowledge the Panel's recommendation that market supplements could be used to attract and retain suitable candidates. The Personnel Policy and Procedures Manuals are given to all IRS and placed on the Local Area Networks in principal sites.

ILRI agrees with the principle of equal pay for equal work. We will reassess compensation practices taking in account the requirements of local, regional and international markets and develop pay levels accordingly.

14. *To ensure implementation of the proposed restructuring and integration of ILRI's research programme, and to utilize cost effectively the valuable research infrastructure, the Panel **recommends** the following action plan for achieving proper utilization of ILRI's facilities in Ethiopia:*

- i) in close consultation with the Government of Ethiopia, ILRI redoubles its efforts to accommodate international agricultural research- and training- oriented programmes on its Ethiopian premises; the conditions of such accommodation, which may also include*

technical and administrative support, are to be guided by the ILRI-GoE host country agreement and to be based on full cost-recovery,

- ii) with respect to its own Ethiopia-based research programme, ILRI emphasise strategic research aspects, with international scope, in the context of restructuring ILRI's research programme, as recommended in the programme- related Chapters of this report,*
- iii) by the end of the year 2001 an external evaluation will establish progress in implementing this recommendation and propose further steps needed.*

Agreed: ILRI Board and Management are committed to the most cost effective and best programmatic use of research infrastructure at all sites. We believe the infrastructure in Ethiopia is a valuable resource for the CGIAR system, especially for activities oriented to sub-Saharan Africa, as well as for ILRI.

ILRI will increase efforts to ensure best use is made of these facilities by CGIAR Centres and others on a full cost recovery basis, guided by terms of the host country agreement. ILRI's forthcoming strategic planning exercise will specifically address the Panel's recommendations for ILRI's research activities in Ethiopia. An external evaluation will be convened before the end of the year 2001.

Nairobi, Kenya - March 5, 1999

Dr. Donald Winkelmann
Chair
Technical Advisory Committee
Consultative Group on International Agricultural Research
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Santa Fe, NM 87501, USA

Mr. Alexander von der Osten
Executive Secretary
Consultative Group on International Agricultural Research
The World Bank
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Dear Dr. Winkelmann and Mr. von der Osten:

On behalf of the Panel, I am pleased to submit to you the Report of the First External Programme and Management Review (EPMR) of the International Livestock Research Institute (ILRI).

The Panel members with whom I worked on this review brought extraordinary skill and commitment to the task. They made every effort to analyse ILRI's entire programme and management in depth so as to be able to offer a conscientious and even-handed assessment of the Institute and make constructive recommendations.

The Panel is convinced that the CGIAR's decision in 1994 to integrate ILRAD and ILCA was correct, and that the Institute has responded positively. ILRI's Management, particularly the DG, Hank Fitzhugh, staff, and Board deserve applause for this achievement.

We are further convinced that the Institute continues to be worthy of strong donor support. Although we point out areas of weakness, we want to make it clear that we believe ILRI has the potential to make a significant contribution to CGIAR goals in the area of animal agriculture. It will be greatly strengthened if Management and Board sharpen the focus of the research agenda and clearly define the "platforms of essential capacity" that should be preserved to carry the Institute forward. The Panel found this concept, put forward by ILRI Management, a useful strategic tool for a global Institute wishing to establish its long-term leadership in key research areas such as genomics/genetics, immunology, molecular biology, epidemiology, system science, and nutrition.

We have pointed out in our first chapter the extraordinary need for livestock and their products in the tropics that will evolve as we move into the twenty-first century. We believe that ILRI, with a suitably refined and reinvigorated research agenda, will be well positioned to face the challenges ahead and fulfil the mandate assigned by the CGIAR. Given the dynamism of the animal agriculture sector, the strategy laid out by those who participated in

the Institute's creation must be revisited—and must be driven by a compelling vision of what the Institute, with its CGIAR Centre, ARI, NARS, and other partners can achieve together to ameliorate poverty, ensure food security, and preserve the environment.

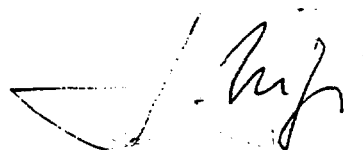
We want to acknowledge the assistance given us by ILRI Management, Board members, and staff with whom we came in contact. The documentation presented to the Panel was comprehensive, and staff were generous with their time and open in offering their views and responding to our questions. The Panel is grateful for their help that made it possible for us to complete a complex task on schedule.

We are also very grateful to Directors of ILRI's partner and stakeholder institutions and their staff who have provided most valuable information in direct interaction with the Panel as well as in an extensive survey carried out to establish a profile of their experiences and expectations with ILRI.

We also want to acknowledge the assistance of our resource person from the CGIAR Secretariat, Pammi Sachdeva; the Panel Secretary sent by TAC, Donald Plucknett; and Guido Gryseels, formerly of the TAC Secretariat. The long experience and exceptional ability of these three persons were a significant contribution to the Panel's work, with respect to both substance and presentation of the report. Arlene Rutherford of the ILRI staff assembled the numerous documents and provided logistical support, and we greatly appreciated her effective assistance that was most pleasantly rendered. Ann Drummond from the TAC Secretariat and Ebby Irungu, also of the ILRI staff, worked congenially with a group of demanding Panel members and are responsible for the report's efficient production.

I speak for all members of the Panel in thanking you for giving us the opportunity to participate in such an absorbing and important assignment.

Yours sincerely,

A handwritten signature in dark ink, appearing to read 'S. Jutzi', is written over a faint, stylized line drawing of a signature.

Samuel Jutzi
Chair, ILRI EPMR Panel

CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH
TECHNICAL ADVISORY COMMITTEE AND CGIAR SECRETARIAT

**REPORT OF THE
FIRST EXTERNAL PROGRAMME AND MANAGEMENT REVIEW
OF THE
INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE
(ILRI)**

Review Panel:

Dr. Samuel Jutzi (Chair)
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Dr. Patricio Faylon
Ms. Joan Joshi
Dr. Carlos Pomareda
Dr. Louise Setshwaelo
Dr. Andrew Tait
Dr. Xuan Vo-Tong

Dr. Donald L. Plucknett (Panel Secretary)
Dr. Paramjit Sachdeva (CGIAR Secretariat)
Dr. Guido Gryseels (TAC Secretariat)

TAC SECRETARIAT

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

March 1999

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SUMMARY AND RECOMMENDATIONS

In 1995 ILRI was formed by the integration of ILCA and ILRAD to carry out a unified strategy for global livestock research. Four years later the new Institute is striving to achieve its global mandate through multi-disciplinary research and with a new institutional and management structure. The first External Programme and Management Review of ILRI was carried out during September 13-22, 1998 and February 15 through March 5, 1999. The report was presented to ILRI Board and Management on March 8, 1999.

The Panel was given general and specific Terms of Reference for the review by the TAC Secretariat and TAC Chairman, respectively, and the main topics therein will form the outline of this Summary, followed by a list of the Panel's recommendations, which are numbered in sequence as they appear in the report and will be referred to in the Summary by those numbers (e.g., R-1, R-2, etc.).

Mission, Strategy and Priorities

The Panel concluded that the mission of ILRI is even more pertinent than when the Institute was established in 1995. Chapter 1 of the report presents an overview of global animal agriculture and presents a clear case for international research, considering the importance of livestock in developing countries, the need for increasing global food supplies, dramatic changes in livestock production and major changes in diet - increasing consumption of milk, meat and eggs - and increased demand for high quality foods. Other factors noted by the Panel included the growth of industrial livestock production, much increased importance of monogastric animals, increased vertical integration, and increasing exports of livestock products from developing countries.

The Panel endorsed the general thrust of ILRI's mandate, to focus primarily on ruminant livestock, to conduct research in livestock diseases and production systems, and to serve as a convenor of livestock-related research in the CGIAR (Chapter 10, R-11).

The Panel noted that considerable progress had been made in developing a unified programme at ILRI, but that the Institute was spread too thinly because it was trying to do too much. Also, many unprecedented opportunities are presenting themselves, as a result of major changes in the external environment. Hence the Panel concluded that ILRI needs to revisit its strategies and priorities (see Chapters 2, 3, R-2), improve its planning processes (Chapter 3, R-2), and focus its research (Chapter 3, 4).

Quality and Relevance

As noted above the Panel was concerned about a need for more research focus (Chapters 6 – 8; R-6, R-7, R-8, R-9, R-10). To help in this the Panel recommended strengthening research leadership (Chapter 5, R-5), and defining in more detail ILRI's priorities and strategies.

The Panel commended ILRI for identifying a potentially powerful concept in building essential areas of research competence and management, that of 'platforms of essential

capacity' (Chapter 3, R-1; Chapter 11); however, this concept needs to be developed further in more specific terms.

To position ILRI for the future, the Panel saw the need for further integration and consolidation of the research programme (Chapters 6 – 8, R-6, R-7, R-8, R-9, R-10). Further, to strengthen scientific leadership and planning, the Panel saw a need for a Deputy Director General (Research) to oversee ILRI's research agenda (Chapter 5, R-5). The Panel was pleased that ILRI has many modes of partnerships with NARS and other institutions (Chapters 9 and 10) and recommended that the Institute redefine its role as convenor for system-wide programmes (Chapter 10, R-11).

Considerable time was spent by the Panel in assessing science quality at ILRI, and discussing indicators and methods to do this (Chapter 11). The Panel concluded that most of ILRI's research meets acceptable criteria of "good science", but improvement is still needed (Chapter 11), to move toward the excellence expected of the Institute. About half of the projects were considered to have good focus. Also, there appeared to be a correlation between focus and the amount and quality of research outputs. Some projects lacked critical mass, and this may have inhibited output. Publication rates at ILRI appear to be good, but it was difficult to differentiate between ILRI publications and those originating from ILRAD and ILCA (Chapter 11). The Panel concluded that ILRI should develop specific mechanisms to ensure scientific quality (Chapter 11, R-12). The Panel regretted that the Centre-Commissioned External Reviews (CCERs) were used mostly for planning purposes and said little about science quality or methods used for its assessment (Chapter 11).

The Panel is confident that once the research programme is restructured and integrated as proposed, ILRI would be well poised to enhance its leadership role in livestock-related research.

Effectiveness and Efficiency of Management

ILRI has a well-selected and reasonably diverse Board. In its operations, it follows well-thought out procedures in very effective pattern that differs somewhat from that usually seen in the CGIAR System. The Board has been especially conscientious with respect to its fiduciary responsibility, carefully protecting ILRI's reserves and thus ensuring the Institute's short-term security. Although it considers in depth programmatic questions and includes members well qualified to contribute in this area, it has not promoted the planning that would sharpen the focus of the research agenda as suggested in Chapter 3 (R-1 and-2), despite recognition on the part of some members that this would be desirable. A related recommendation (R 3 points up the need to promulgate widely policy decisions made by the Board over the years, especially in the programme area, that have not been made easily available to staff. The Panel further observed that the line between the responsibilities of Board and Management is unusually blurred and has made a recommendation that a sharper distinction be established (R 4).

ILRI's leadership deserves commendation for undertaking the merger of two quite disparate institutions with success and for putting in place early effective financial, human resources, and other administration systems (but see recommendations re salary equity in Chapter 12, R-13). Increasing attention is needed, however, in ensuring cost-effective use of the Institute's valuable infrastructure, especially in Ethiopia (Chapter 12, R-14). The Director General has

kept a sharp eye on ILRI's financial resources and responded promptly and well to funding circumstances that changed precipitously and that required him to seek a substantial increase in project funding. He did so almost threefold over four years. On the other hand, the Panel found a hesitation to delegate authority and to make the essential incisive decisions regarding strategy and priorities as discussed in Chapter 3 (R 1 and 2). The Panel also sees a need for ILRI leadership to promote among staff a shared and compelling vision of the Institute's future direction.

The Panel has carefully analysed ILRI's organisational structure and made a number of suggestions as to how realignment of research and research-related activities into five programmes, as well as the consolidation of some project staff from sites in Ethiopia to the Nairobi campus, would facilitate interaction among scientists, especially the exchange and maturation of keen ideas into research of the highest priority and quality. Central to the suggestions and recommendations in Chapter 5 (R 5) is the appointment of a Deputy Director General (Research) to take a primary role in planning, priority setting, management of high quality research, and promotion of inter-programme integration while the Director General focuses on external relations as he must.

ILRI staff is competent and committed at all levels. Staff councils are in place to bring concerns both to Management and Board, and, despite inevitable concerns, staff say the Institute is a good place to work and that disparate cultures of ILRI's parent institutions are close to union.

Accomplishments and Impact

The Panel has detailed the main achievements of ILRI in the chapters of this report and has discussed the issues surrounding the assessment of impact (Chapter 9, 11). In general the achievements have been good in a context of the evolution of the organisation and the changing financial environment. Most of the projects are producing significant output which has potential impact, and a number are beginning to produce impact directly. The Panel commends the increased activity in policy and impact analysis together with the increased awareness of the need for practical impact.

At the basic scientific level, the research on animal genetic resources and disease resistance/tolerance was viewed as an area where ILRI is becoming a world leader, while in the development of diagnostics significant advances have been made. If appropriate focus and clear-cut strategies are provided in vaccine research, significant advances can be made, particularly when integrated with the strong expertise base in epidemiology which is also evaluating existing control measures. This is a long-term research effort, for which adequate donor funding would be justified and necessary.

The research on livestock productivity under disease risk (Chapter 6, R-9) and smallholder dairy systems (Chapter 7, R-9) provides a model of effectiveness in the Production Systems Programme that the other projects need to use to achieve their goals (Chapter 6, 7; R-6, R-9). It is particularly critical that feed resources and nutrition gain significantly in terms of focus and research quality (Chapter 6, R-8). Overall, the production systems research has many elements of good quality on which to form the basis for rethinking the strategy for crop-livestock systems research.

Advances have been made in generating linkages with NARS through training, networks and information technology (Chapter 9, 10). To complement ILRI's research, networks need more emphasis on collaborative research, rather than on institution building.

The main concerns were in the breadth of the research and the consequent need to focus on fewer areas to ensure both significant scientific advance and increased impact. To gain in the two latter areas will require a greater concentration on scientific leadership and incisive decision-making regarding priorities and strategies and the hard choices involved. Output levels in research appear to be at a critical point where a downward trend is appearing; this should be addressed urgently.

Concluding Remarks

ILRI has successfully integrated two former centres, ILCA and ILRAD, into a new global centre with a global mandate. In four years it has accomplished much in establishing new management systems and integrating its research. Research accomplishments continue to be made. The research quality can be rated as "good" to "very good" in several areas. The Panel has identified areas of significant strength, but these need to be built upon to realise ILRI's potential as an international centre that leads the world in livestock research. A key component to achieving this position will lie in continued investment in biotechnology research and its associated disciplines.

LIST OF RECOMMENDATIONS

CHAPTER 3 - STRATEGY, PRIORITIES AND PLANNING

1. Believing that ILRI has identified a potentially powerful concept in building essential areas of science planning and management, the Panel **recommends** that ILRI define and further develop its 'platforms of essential capacity', including such concepts as core competence in key research areas.
2. Considering the need to orient livestock research more closely towards the requirements of rapidly changing animal agriculture in developing countries, and the need to define and operationalise ILRI's global mandate more precisely, the Panel **recommends** that ILRI revisits its vision, strategy, and priorities and redesign its planning processes to position the Institute compellingly at the core of the international animal agriculture research agenda.

CHAPTER 4 - GOVERNANCE, LEADERSHIP AND ORGANIZATIONAL CULTURE

3. Since policies established by the Board over the years, particularly in the programme area, have not been made widely known, the Panel **recommends** that past policies be retrieved from the records and disseminated in such a way that they are available for reference as needed both by current and newly recruited staff, and that those approved in the future be similarly and promptly made known.

4. Because the line between the responsibilities of Board and Management appears to be inappropriately drawn at ILRI, the Panel **recommends** that the Board clearly focus on its policy formulation and oversight functions, and establish a sharper distinction between its responsibilities and those of Management.

CHAPTER 5 - INSTITUTIONAL STRUCTURE AND MANAGEMENT

5. To ensure strong scientific leadership and incisive decision-making, the Panel **recommends** that ILRI modify its organisational structure to include the following elements (see Figure 5.2):
 - i) A new office of Deputy Director General (Research) to act in the absence of the Director General, oversee ILRI's research agenda, take a primary role in planning and priority setting exercises, promote inter-programme collaboration, and provide independent analysis of the resource needs of research programmes. The DDG (Research) would also oversee the Research Support Units.
 - ii) The current research and research-related agenda consolidated into five programmes as follows: Animal Genetics and Genomics; Animal Disease Control; System Science, Impact, and Policy Analysis; Production Systems and Animal Nutrition; and International Co-operation.
 - iii) The programmes consisting of projects as at present, though with a different configuration (as proposed in Chapters 6, 7, and 8).
 - iv) One unit -- the Office of External Relations -- in a staff relationship to the Director General to continue co-ordinating the Institute's fundraising and public awareness activities.
 - v) No change in the responsibilities of the Administration department, which would retain responsibility for finance, human resources management, information technology services, and administration of both Nairobi and Addis campuses.

CHAPTER 6 - BIOSCIENCES

6. To ensure research quality and productivity by having project co-ordinators and their research teams work together on a daily basis and thereby achieve cross-fertilisation of ideas, catalyse critical thinking, and design cutting-edge research and research proposals, the Panel **recommends** that Project 1 (Characterisation, conservation and use of animal genetic resources) and Project 2 (Development of disease resistant livestock) be managed at the Nairobi campus.
7. Because the slow pace and past unrealistic timescales have led to a lack of credibility in the area of ILRI vaccine research, the Panel **recommends** that the research on vaccine development (ECF and Trypanosomosis) be critically reviewed with the aim of clearly defining a strategy and programme for developing further antigens for the

ECF vaccine and evaluating whether a vaccine against trypanosomes is a viable prospect.

8. To integrate a systematic global evaluation of forages, crop residues and other feeds with the nutritional evaluation of dietary options to increase animal productivity and net economic returns, the Panel **recommends** merging Projects 8, 9 and 10 (Feed utilisation improvement for improving livestock productivity; Rumen microbiology for feed utilisation enhancement; and Characterisation and conservation of forage genetic resources) into a cohesive Ruminant Nutrition Management Project.

CHAPTER 7 - SUSTAINABLE PRODUCTION SYSTEMS PROGRAMME

9. To stimulate income growth and food security for farm families, to help alleviate poverty, and to conserve natural resources, the Panel **recommends** that ILRI strategically orient the production systems research programme, and establish an ecoregional or global consortium for market-oriented crop-livestock systems. To accomplish this:
 - i) Project 19 (Market-oriented smallholder dairy systems) should be broadened beyond dairy to constitute a transregional or global research project that is especially aimed at enhancing economic growth of rural households by developing more profitable and sustainable market-oriented crop-livestock systems.
 - ii) Scientific staff in Project 13 (Crop-livestock systems in the highlands of SSA and Asia) be re-assigned, possibly to Project 19, to increase the critical mass of scientists focusing on transregional research objectives and market-oriented systems.
 - iii) The expertise of Project 14 (Crop-livestock systems in subhumid SSA and Asia) and Project 15 (Crop-livestock systems in semi-arid zones of SSA and Asia) could be consolidated to form one project having more critical mass to focus on market-oriented systems in the subhumid zone, co-ordinated with Project 19, although not restricted to dairy.
 - iv) If Project 16 (Crop-livestock systems in fragile environments in LAC) is to be continued, it should become part of the transregional smallholder livestock systems effort of the re-designed Project 19 with a full-time ILRI staff member.

CHAPTER 8 - RESEARCH ON IMPACT ASSESSMENT AND POLICY ANALYSIS

10. To enable the necessary integration of impact assessment and policy research, better orient the Institute's biophysical and production systems research (and its priorities), and provide a firm base for delivering outputs and generating impact, the Panel **recommends** that Projects 11 (Systems Analysis and Impact Assessment) and 12 (Policy Analysis) be merged, with all staff operating at ILRI's headquarters in Nairobi.

CHAPTER 10 - EXTERNAL RELATIONS AND PARTNERSHIPS

11. To address concerns regarding ILRI's interpretation of the convenor role in managing systemwide programmes of the CGIAR, the Panel **recommends** that ILRI
 - i) redefine its role in the Systemwide Livestock Programme (SLP) to conform with the TAC-recommended function of a system-wide programme convenor,
 - ii) withdraw those parts of its own research programme from the SLP over which the Inter-Centre Livestock Programme Group has no jurisdiction, thus enabling the entire portfolio of the Programme to be guided by procedures agreed in the SLP, and
 - iii) refrain from reporting the SLP as part of ILRI's research portfolio.

CHAPTER 11 - CROSS-CUTTING ISSUES

12. To maintain and enhance ILRI's scientific reputation, the Panel **recommends** that the Institute develop and use explicit mechanisms for ensuring scientific quality and the effectiveness and utility of its outputs.

CHAPTER 12 - ADMINISTRATION

13. Because ILRI does not have an adequately defined and transparent system with which to classify internationally recruited staff (IRS), determine salaries, and ensure equity in compensation, the Panel **recommends** that:
 - i) the categories of scientist, programme specialist, and administrator be expanded to differentiate positions with differing levels of responsibility, authority, knowledge, and skills;
 - ii) a salary range for each IRS level be developed and applied in all cases;
 - iii) where, in infrequent instances, market values for particular skills necessitate payment of a salary higher than that of equivalent positions, a market supplement be given to attract and retain suitable candidates; and
 - iv) information on the policies and procedures of the classification and compensation system be provided to all IRS staff.
14. To ensure implementation of the proposed restructuring and integration of ILRI's research programme, and to utilise cost effectively the valuable research infrastructure, the Panel **recommends** the following action plan for achieving proper utilisation of ILRI's facilities in Ethiopia:
 - i) in close consultation with the Government of Ethiopia, ILRI redoubles its efforts to accommodate international agricultural research- and training-oriented programmes on its Ethiopian premises; the conditions of such

accommodation, which may also include technical and administrative support, are to be guided by the ILRI-GoE host country agreement and to be based on full cost-recovery,

- ii) with respect to its own Ethiopia-based research programme, ILRI emphasise strategic research aspects, with international scope, in the context of restructuring ILRI's research programme, as recommended in the programme-related Chapters of this report,
- iii) by the end of the year 2001 an external evaluation will establish progress in implementing this recommendation and propose further steps needed.

CHAPTER 1 - A GLOBAL PERSPECTIVE ON TROPICAL ANIMAL AGRICULTURE

Global Changes in Animal Agriculture

Animal agriculture in grazing, mixed crop-livestock, specialised and industrial systems is an integral part of food-producing systems, with food of animal origin providing about one sixth of human food energy and a third of the protein on a global basis.

Animals convert forages, crop residues and food and fibre by-products to high quality human food, provide draught power for about half the world's crop production and manure to help maintain soil fertility, and are an important part of rural economies.

Animals also consume one-third of the global grain supply, and in a world with the human population estimated to reach 7.7 billion by 2020, and with limited opportunity to expand arable land, the role of animal agriculture in human food supply for developing countries is likely to grow substantially.

Higher incomes (3.8% increase per annum in developing countries from 1985 to 1995) associated with rapid urbanisation and high population growth (2% per annum) lead to increased consumption of meat, milk and eggs in the developing countries'. There is also increased demand for quality products, particularly from growing middle income classes. The expansion of the livestock industry, with annual growth rates from 1982 to 1993 for all developing countries of 7.4% for poultry, 6.1% for pork, 5.3% for all meat and 3.1% for milk, is a multiple of the expansion of cereal production indicating major shifts occurring in the diets of billions of people in the developing world.

Consumption of meat, milk and eggs varies widely among countries, reflecting differences in food production resources, production systems, income and cultural factors. People in developing Asia and Africa currently consume about 3 to 4 times less meat, and 5 to 6 times less milk products per caput compared to developed countries (OECD). However, per caput meat consumption in developing countries is projected to more than double by 2020, while in developed countries it is projected to increase no more - and less in some cases - than human population. Since more than three-quarters of the world's population live in developing countries, global demand for meat is estimated to increase by more than 60% by 2020, with 88% of this expansion estimated to occur in developing countries. The developing countries' share of total world meat consumption is estimated to expand from 47% currently to 63% by 2020.

Industrial livestock production in the developing world grows at twice the rate of livestock output in mixed farming systems, and more than six times the rate in grazing systems. On average, grain feeding to ruminants is expanding at 4% per year for all developing countries.

As a result of these dynamic shifts the food function of livestock is becoming more important, whereas non-food functions such as draught, manure and asset creation are diminishing in importance, especially in Asia and LAC. In addition, there is a significant shift from ruminant to monogastric animals; pork and poultry meat already represent more than two-thirds of the total meat consumed in developing countries. Africa is rapidly catching up with the rate of development in Asia and LAC, with annual growth rates of meat production of 7% in industrial systems and 2.5% in mixed production systems.

At the same time, the structure of animal production is changing; in particular, vertical integration of the industry is expanding. Demand for products increasingly drives livestock production more so than the availability of resources such as feed or water. The importance of tropical and sub-tropical sub-humid and humid zones for livestock production is increasing. Industrial and mixed farming systems are expanding while grazing systems are losing their relative importance. Technological shifts to intensive and more specialised systems are evident, and the search for improved efficiency of livestock production leads to substantial changes in the patterns of livestock management and disease epidemiology.

The drastic expansion of the livestock industry stretches the capacity of existing production systems, exacerbating environmental problems and increasing concerns about zoonoses and public health issues associated with livestock and livestock products. Where the demand for animal products increases rapidly, land-based systems often fail to respond, leading to animal concentrations that are out of balance with the feed supply as well as the waste absorption capacity of the available land. Because of animal and human health hazards, industrial animal production is typically moved beyond city boundaries as soon as infrastructural development permits.

Livestock products are increasingly important export commodities for developing countries. In 1994/6, export earnings either from dairy and meat or from hides, skins, wool and leather nearly equalled the total value of cereals exported by developing countries (92-94% as large). Either the value of leather footwear exports or the total of other livestock commodities (dairy and meat plus hides, skins, wool, leather) dwarfed the total value of trade in cereals, as well as either coffee, aggregate earnings from banana and sugar, or natural rubber. The total value of livestock exports by developing countries was 43% larger than the aggregate export earnings from cereals, pulses, oilseeds and oilcakes; and it was 7% larger than earnings from all exports of fruits and vegetables. Income of developing countries from the export of livestock products has thus substantially increased in the past 10-15 years. Furthermore, the equity distribution of benefits from livestock production is probably similar to that of coffee and cacao, where many small producers share in the economic returns.

Key Functions of Livestock

While the livestock sector is faced with new opportunities and challenges, there are also important functions of livestock which will remain important. Through its contribution to income generation, animal production is an efficient entry point for rural development and poverty alleviation. Livestock are a significant component of the livelihood of more than 60% of the world's poor. Animal production provides direct and continuous cash flow through sales of milk, meat and eggs. Indirect income is contributed through draught power and transportation. Livestock can also generate other employment.

The relationship between the consumption of food of animal origin and human health is the subject of much debate. At low levels of intake of food from animals, however, as observed in the developing world, an increase of the consumption of such food commodities is known to be nutritionally beneficial, especially for children, due to the content and availability of micronutrients (minerals and vitamins) and of essential amino-acids. Therefore, if achieved, increased per caput intake of foods of animal origin in developing countries should improve the nutritional status of people there.

Livestock contribute to achieving more efficient and more sustainable resource use through enhanced energy and nutrient cycles. For instance, animal manure increases soil fertility, soil structure and water-holding capacity. About two-thirds of the world's *walking crops* - livestock - are utilised in farming systems in developing countries where nutrients are scarce or limiting.

The livestock component in agricultural land use thus may be viewed as a crucial biophysical and socio-economic linchpin of organic and mineral nutrient cycling for the maintenance of resilience and productivity of the natural resource base, primarily, but not exclusively, in complex land use systems.

Thus, the integration of crops and livestock represents the main avenue for intensification of food production in most regions, but especially - and increasingly - in the more humid areas. Mixed farming provides farmers with the opportunity to reduce risks and to add value to available labour and natural resources, while exploiting vital synergies between animal and crop components for the production of marketable surpluses. However, in developing regions with increasing human populations, mixed farming systems have a negative nutrient balance, and deficits are only partially covered by a flow of nutrients from grazing areas to cropland. As population pressure increases, so does the crop-to-grazing-land ratio and, where other nutrient sources are not available, soil fertility gaps tend to widen.

Risks Associated with Livestock

The livestock sector continues to be associated with substantial risks. Degradation of natural resources is a major threat, varying from land degradation (e.g., in overstocked grassland), deforestation (e.g., for ranching), erosion of biodiversity (both plant and animal genetic resources), human health hazards related to animal production, and nutrient imbalances or waste production, according to production system and policy framework. Livestock are also associated - through the emission of greenhouse gases - with global climate change and fears that tropical livestock diseases may move to currently temperate regions. Competition between food and feed, technological change, often implying less employment, are other risks which can disrupt the search for equity.

In addition, animal diseases emerge or re-emerge and remain important risks in production. The main driving forces are increasing livestock densities, changing ecologies, different movements of humans, animals and livestock products, changing settlement patterns and changing food chains. Increased global trade in livestock and livestock products imply substantially increased risks of cross-boundary disease transmission.

The animal health industry is adjusting dynamically to these challenges with an expected annual growth of 4-6% up to the year 2010. Priority issues addressed are linked to

epidemic diseases, sustainability of prophylactic and routine chemotherapy, food-chain-based quality control and food safety.

Building a Tropical Animal Agriculture Research Agenda

The above summary of dynamic developments amounts to a drastic - if not revolutionary - shift in global food supply for the human population. These developments are associated with very substantial structural changes in production, processing, marketing and policy frameworks and with significant new opportunities and risks. Large investments in research are required to guide this process and help protect it from inherent risks.

Such research is to be determined by the livestock functions of providing food security, contributing to alleviate poverty, protecting the environment and conserving the natural resource base, and securing public health.

In addition to the dynamic changes affecting the livestock sector itself, there are several general trends which need to be taken into account when animal agriculture research is to be successfully positioned.

There is a worldwide tendency to redefine the role of the state and to promote wider participation of the private sector in economic life rather than the state itself being involved in production activities. As a consequence of this tendency, there is a strong pressure to emphasise market-oriented animal research and to connect research to product development. Developing country NARS are rapidly undergoing a corresponding change in orientation.

Continuing globalisation and trade liberalisation not only significantly reduce domestic policy options, but also emphasise the concepts of comparative advantage and competitiveness. NARS agendas will continue to be redefined to suit these market forces. This trend exacerbates the dichotomy between subsistence, sustainability and equity-oriented research aspects on the one hand, and productivity enhancing, market-oriented research aspects on the other.

The fact that a rapidly increasing share of the population of developing countries will live in cities has major implications for the role of agriculture in general, and animal agriculture in particular, both in rural and peri-urban areas. Given that the absolute number of poor people in urban areas is much higher than in rural areas and continues to increase rapidly, the risk is great that a bias against the rural poor will prevail in poverty alleviation strategies.

Risks arising from pressure on natural resources, in particular genetic resources, water and land, and from degradation of the natural resource base are likely to increase as competition for resource use intensifies, particularly where market forces fail to ensure efficient resource management. Biological diversity will continue to be threatened as traditional cultivars and breeds are abandoned, deforestation continues and habitats are lost. Some 30% of livestock breeds worldwide are already at the point of extinction.

Technological developments will occur in all areas, but will not be equally accessible to all countries, which may influence their ability to compete in global markets. Technological advances are likely to be important in the areas of biotechnology, information

technology and communication. Agricultural research will become increasingly globalised, with the private sector conducting most biotechnology research. The needs of resource-poor farmers in developing countries are unlikely to be addressed adequately by the private sector. This implies the need for the public sector, including international institutions such as ILRI, to fill the gap.

The impact of biotechnology in agricultural technological systems is amplified by the growing acceptance of intellectual property rights all over the world. As a consequence, the adherence to and the implications of the concept of 'public good', traditionally associated with international research, may need to be reconsidered. This may decide whether centres such as ILRI can be successful agents in this market.

A new IFPRI study on investment trends in agricultural research and development confirms slowing growth in agricultural R&D spending. The study also notes a slow-down of growth in international agricultural R&D spending, detects a shift in industrialised- vs. developing country shares of total R&D spending in favour of the industrialised countries and, therefore, documents a widening of the agricultural research intensity gap.

In addition to these general trends, animal agriculture research is faced with widespread reservations related with the association between livestock and resource degradation and between the consumption of foods of animal origin and human health problems.

The IFPRI study pays particular attention to Africa where on the one hand there was a significant increase in the number and qualifications of scientists but, on the other hand, a precipitous decline in support per scientist and a very significant increase in the external donor share of total and operational funding. In Africa, therefore, more than in Asia and LAC, the sustainability of the NARS as main partners for ILRI is threatened.

In the ever more complex and dynamic external environment in which ILRI has to work, it is of paramount importance that the Centre conveys a compelling vision of its *raison d'être*. The basis of this vision is a careful analysis of the major forces driving the external environment, consideration of its comparative advantages and considerations of developmental needs.

In the design of the Centre's strategy, there is much justification for emphasising market-driven elements and to link them effectively to the relevant collaborative framework on the basis of comparative institutional advantages. This will provide the Centre with the necessary recognition as a successful market participant, with international acceptance as a centre of excellence in international livestock research, and with the institutional strength to embark on essential activities which may not be as vigorously supported by market forces.

International animal agriculture research, as mandated to ILRI by the CGIAR, is expected to be at the centre of the global endeavour to provide tomorrow's solutions to the critical problems of the rapidly expanding and changing livestock sector. With its global mandate, therefore, ILRI is best placed to emphasise strategic research dimensions in the supply of products, methodologies and technologies in the areas of biotechnology and genomics applied to livestock and their diseases, and to prepare for the post-genomics era in livestock research. Strategic animal nutrition research is the second element of this international agenda to underpin biophysically enhanced livestock production.

It is therefore argued in this report that ILRI is likely to be best positioned in this context in addressing the improvement of tropical animal health and production in an integrated manner; this will be achieved by focusing – on the biological side – on genetic, diagnostic, epidemiological and nutrition technologies and resources, and - on the production systems side – on carefully selected, dynamic, market-oriented animal production systems (e.g., dairy systems). Such research efforts need to be complemented by livestock policy, systems analysis and impact analysis research. This agenda will strategically serve the livestock functions in its focal areas of poverty alleviation, food security, health, and environment.

CHAPTER 2 - INTRODUCTION

2.1 The Mandate of ILRI

The studies that led to the establishment of the International Livestock Research Institute (ILRI) recommended an expansion of CGIAR livestock research from the focus on sub-Saharan Africa that had characterised the research of ILCA and ILRAD to a broader portfolio that would address the priorities on a global scale. Two kinds of systemwide responsibilities were prescribed for the new Institute: 1) a global mandate with respect to its own livestock research and 2) a convenor role with respect to livestock-related research across the sixteen CGIAR centres. See Box 2.1 for ILRI's current mandate, mission, and objectives.

The International Livestock Research Institute (ILRI)

Mandate

ILRI has a global mandate for livestock research in developing countries through which it contributes to food security, poverty alleviation and environmentally sound management of natural resources.

Mission

ILRI's mission is to:

Enhance the well-being of present and future generations in developing countries through research that improves sustainable livestock production

Objectives

To improve the productivity of smallholder livestock systems and protect the natural resources that support them.

ILRI's first strategic plan asserted that the Institute's aim is to contribute to sustainable improvements in the productivity of animal agriculture in developing countries in ways that enhance nutrition and wellbeing, especially of low-income people. It laid down the following operational goals:

- to serve within the CGIAR as a world centre for research on major problems of animal production and health;
- to provide ways and means of controlling major animal diseases which seriously limit livestock production;

- to strengthen the ability of NARS to conduct technical and policy research on sustainable livestock systems and thus to develop their own technical solutions to production problems and to promote environmentally sound animal agriculture and rural development;
- to develop, through its own research and in pro-active collaboration with other organizations, technical solutions for increasing livestock production and enhancing the contribution of livestock to sustainable agricultural production and equitable income distribution;
- to contribute to scientific knowledge in a way conducive to solving livestock production problems; such knowledge should relate to the understanding of production and natural resource management constraints and opportunities or to research methods and techniques; and
- to act as lead organization and also as catalyst for CGIAR livestock research.

Further discussion of ILRI's strategy and priorities is provided in Chapter 3.

2.2 Legal Status

ILRI is an autonomous, non-profit international organization with independent juridical personality. It was officially established with the accession to the Agreement on the Establishment of the International Livestock Research Institute on 21 September 1994 by five signatory governments and the United Nations Environment Programme. The Government of Switzerland, which sponsored ILRI as an international organization, hosted the formal establishment ceremony and acted as the depository for the Agreement and the Constitution of the new Institute.

Subsequently, two host country agreements were negotiated. An agreement was concluded with the Government of Kenya on 29 December 1994; a second was signed with the Transitional Government of Ethiopia on 8 June 1995. In both documents, the respective governments agreed to apply to ILRI, its staff, properties and assets the provisions of the Convention on the Privileges and Immunities of the Specialised Agencies adopted by the United Nations General Assembly on 21 November 1947.

2.3 Origin and Evolution

ILCA and ILRAD were both formed in the early 1970s with mandates focussing principally on Africa. They evolved in parallel, co-operating in selected areas such as research on various aspects of trypanosomosis. From the start, ILRAD's programmes were more strategic, while those of ILCA were more applied and more closely linked to NARS and their networks. Substantial infrastructure was established for the two centres: modern laboratories in molecular immunology and biology were developed for ILRAD in Nairobi; ILCA established a central laboratory complex and experiment stations in Ethiopia, plus operating locations in Kenya, Mali, Niger, Nigeria, and Zimbabwe. Funds for both institutions were generally adequate in the early years and through the decade of the 1980s. With the concurrent establishment of new CGIAR centres and funding pressures on most donors in the early 1990s, however, both suffered substantial losses in research capacity.

From the time of the initial creation of ILCA and ILRAD, donors had considered establishment of a single institution to conduct research on animal health and production. Although the perspective of disciplinary differences had prevailed to form two, subsequent EPMRs reflected the belief that synergies were possible and that some economies could be achieved if the programmes were integrated. Both the decline in funding (see Table 2.1) and some questioning of the potential pay-off of the separate programmes, and even of the general area of livestock research, brought the issue again to the fore in 1993.

Table 2.1 Funding for livestock research at ILRAD, ILCA and ILRI (in US\$ millions)

Year	ILRAD	ILCA	ILRI	Total
1990	13.1	20.9	-	34.0
1991	13.4	19.8	-	33.2
1992	12.7	16.2	-	28.0
1993	10.3	11.8	-	22.1
1994	10.6	14.0	-	24.6
1995	-	-	23.8	23.8
1996	-	-	24.8	24.8
1997	-	-	24.9	24.9
1998	-	-	25.1	25.1

Source: ILRI Funding: Consequences of TAC Recommendations and Changes in CGIAR Financing, ILRI 1999

Two studies¹ in that year, assessing and defining the need for livestock research, led to the recommendation that a single centre with a broadened mandate for future research in this area be established. Although the effort is still referred to as the “merger of ILCA and ILRAD,” the intent of the CGIAR was rather to form a new centre with a global mandate broader than the combination of the existing programmes of those two entities. It was recognised at the outset that differences in the organizational culture and research orientation of the two institutes would need to be harmonised, specifically 1) differences in disciplinary approaches to animal health and production and 2) differences in upstream vs. downstream research.

In parallel with these studies, TAC developed a recommendation that livestock research in the new Institute be related to forage and cropping systems research in the other CGIAR centres. This set the stage for the establishment of the Systemwide Livestock Initiative, later to become the Systemwide Livestock Programme.

The CGIAR took the decision in 1994 to establish an institute for livestock research that would selectively integrate existing programmes of ILCA and ILRAD, operate with a global rather than African mandate for its own research and have a convenor role with respect to the co-ordination of livestock research across the System. The Rockefeller Foundation was commissioned to implement the decision, including development of an institutional strategy, medium-term plan, constitution, rules of governance, status as an international

¹ International Livestock in the CGIAR: Report of the Steering Committee. ICW/93/09, 1993; and Progress Report by the Working Group on Livestock Research. MT/93/16, 1993.

organization and founding Board of Trustees. The task was accomplished in September of that year with the signing of the Establishment Agreement and the first meeting of the founding Board. Shortly thereafter, the Board appointed ILRI's first Director General and established Nairobi as its formal headquarters, with a continuing principal office in Addis Ababa. As noted, host country agreements were subsequently concluded with both the Kenyan and Ethiopian Governments. The formal dissolution of ILCA and ILRAD and the commencement of operational status for ILRI occurred on 1 January 1995.

The Institute's initial Medium-term Plan (1995-1998), based on TAC's recommendation and CGIAR endorsement, anticipated an increase from the first year's budgetary level of US\$-25 million to US\$ 32 million in 1998. It included establishment of the Systemwide Livestock Programme with annual funding of US\$-4 million. Intervening changes in the financial environment, leading to both an overall reduction of expected funding and in the percentage of unrestricted core, however, have necessitated considerable adjustment to operating plans each year. These changes have had the greatest impact on support for ILRI's more strategic biotechnology research that, in the view of its Management and Board, offers the largest potential for future benefit.

2.4 Financial Status

Despite the TAC guideline suggesting that ILRI receive 9.0% of CGIAR donor funds or approximately US\$-29.7 million in 1998, donor income last year amounted to US\$-23.8-million,¹ representing only about 7.2% of the total. Centre-generated income of US\$-1.3-million brought the overall funding available in 1998 to US\$ 25.1, while a Board-approved draw on reserves and the disposal of some fixed assets enabled the Institute to reach an operating expenditure level of US\$ 27.4.

In point of fact, ILRI's new Management and Board have been forced to contend with a difficult and uncertain financial picture since the Institute was established following the dissolution of ILCA and ILRAD. In 1990, for example, the two former Centres enjoyed a joint income of US\$ 34 million. During ILRI's first fiscal year, as noted, contributions and centre-earned income totalled only US\$ 23.8 million, and revenue has remained essentially flat in purchasing power since that time.

In 1996, under pressure from those Centres that had been particularly successful in attracting project funds and who argued that they were being penalised for their success, the CGIAR Finance Committee (FC) recommended a change in the World Bank allocation process from "donor of last resort" to a matching formula. As a result, the Bank's contribution to ILRI in 1995 of US\$ 6.2 million dropped to US\$ 4.2 million in 1998 and would have been lower still without a special grant of funds by the FC from the World Bank's allocation to the CGIAR. In 1999, the World Bank matching funds for ILRI are expected to be just US\$ 2.8 million. The 1996 adjustment of World Bank allocations was accompanied by a reduction in USAID funds to the Institute.

Management has responded to these changes with a concerted effort to solicit restricted funds, successfully increasing funds from this source from US\$ 4.5 million in 1995 to US\$ 12.0 million in 1998, a remarkable 267% increase. In addition, the Board authorised

¹ 1998 figures are provisional, as the accounts for this year had not been audited at the time of this report.

a draw on ILRI's substantial reserves for 1997 of US\$ 2.1 million, of which only US\$ 0.8-million was needed, and US\$ 2.3 million for 1998, of which just US\$ 1.4 million was drawn.

For fiscal 1999, the Board requested preparation of operating budget scenarios at three levels and approved in September 1998 the midpoint budget of US\$ 27.5 million. This approval was based on a careful analysis of funding prospects ranging from 50% to 100% probability and with all fixed and core staff costs covered at the higher percentage. It is not expected to require a draw on reserves, although the Board authorised the Director General to use up to US\$ 0.3 million if, in his judgement, the expenditure would represent a productive investment in the continuing effort to attract project funds. Revisions in revenue expectations have since led to preparation of a 1999 budget of US\$ 28.1 million for presentation to the Board in March of this year. Were TAC's recommended allocation of 9.1% of the 1999 CGIAR contribution total to be followed by donors, however, ILRI could expect total revenue and a balanced budget in the neighbourhood of US\$ 31 million.

As is the case with all CGIAR Centres, ILRI has experienced a reduction in the percentage of fungible unrestricted core. Again, 1991-92 funding of the two former Centres was 79% unrestricted; ILRI's unrestricted core in 1999 is expected to be just 48% of the total, although one third of the remainder is restricted only by programme rather than by project. This compares to a CGIAR Centre average of 63% unrestricted. This change in funding type has important implications for the research plans of all centres. ILRI Management argues that restricted funds tend to support the more downstream areas of research, while those more strategic in nature, principally the research carried out by ILRI's Biosciences Programme, has more difficulty in attracting project funding and is, accordingly, dependent on the decreasing unrestricted core. The reduction in unrestricted funding has affected ILRI's ability to provide partial matching funds to attract new donors and additional project funds. The problem is further exacerbated by the fact that many donors support only operating costs in project budgets, while international staff costs must be covered by unrestricted core.

Unlike some other Centres, however, ILRI has protected its unrestricted funds by relatively firm adherence to its policy of full funding of its restricted grant projects. Its established overhead rate is an unusually low 18% and is comprised of the offices of the Director General, Director of Administration, External Relations, Finance, Human Resources, Administrative Services and General Operating Costs. About 11.5% is collected as some restricted project donors who also provide unrestricted core do not—unfortunately, in the Panel's view—provide overhead. Other cost elements, such as utilities, communications, information technology and library service, often included in overhead allocations at other Centres, are appropriately charged directly to the benefiting project wherever possible.

While dealing with the difficult financial picture, Board and Management have been cautious in preserving the Institute's reserves, and they remain at a high level. (There is a sense among some that ILRI has been penalised for this caution, as other Centres have been allocated special crisis funding rather than drawing on reserves.) At the end of 1998, reserves totalled US\$ 9.7 million, including US\$ 5.7 million in the capital fund and US\$ 4.0 million in the operating fund. The latter represents 52 days operating costs and compares favourably to the CGIAR Centre average of 45 days in 1997. In addition, provision has been made to cover the full cost of leave entitlements and international staff repatriation.

From another perspective, the current ratio (current assets divided by current liabilities—an important measure of liquidity) at the end of 1998 was 2.0 compared to a CGIAR 1997 average of 1.71. The acid ratio, a more stringent test of liquidity in that it excludes inventory, was 1.9.

ILRI invests its reserves and other temporarily surplus funds in US dollar-denominated short-term fixed time deposits with either Citibank in New York or Deutsche Bank in Bonn.

2.5 Resource Mobilisation

As noted above, ILRI staff have mobilised over the last four years to increase project funding close to threefold in response to the declining base of unrestricted core funds experienced by most CGIAR Centres. The number of donors has grown from 25 in 1995 to 36 in 1998. The effort has been led by a director-level staff member who heads the External Relations Office (ERO), assisted by two internationally-recruited and three local staff. The office is responsible for backstopping fundraising work of Management and Project Coordinators by providing up-to-date information on donor priorities, co-ordination of submissions and assistance in developing proposals. For example, staff have produced a useful intranet site and CD-ROM that offer examples of successful project proposals as well as templates for the development of project concept notes, reports, business plans and budgets. They manage a proposal database that enables all staff to track proposals from concept note through submission to final determination and to forecast project funding three years in advance. The database also helps keep track of reporting deadlines and other commitments to donors, with specific contract information open to donors via the Internet.

ERO staff are particularly concerned, however, with identifying new investors, and are giving increased attention to private foundations and non-traditional CGIAR funding agencies, particularly in the field of medicine, with cautious consideration to the prospect of contracts with the private sector. A Board/Management Ad Hoc Committee on Core Resources was instrumental in thinking through strategies in this regard during the past year.

In support of their overall objectives, ERO staff lead the effort, given high priority at ILRI, to raise awareness of the importance of the Institute's mission. They produce both generic and donor-specific public information material, in printed and electronic forms, targeted at donor agency staff, the public in donor countries and research managers and policy makers in developing countries.

2.6 Conduct of the First Review

The members of the Panel charged with conducting ILRI's first External Programme and Management Review met in Addis Ababa for a week-long introduction to the Institute in September 1998. They were accompanied by a Resource Person from the CGIAR Secretariat and a Panel Secretary appointed by TAC. (See the list of members and biographical data in Appendix II). In addition to group and individual meetings with staff and Management, Panel members had the opportunity at this time to attend the Institute's Annual Programme Meeting and at least a portion of the meeting of the Board of Trustees. One member remained in Addis through the remainder of the Board meeting, while others travelled to

Nairobi, IITA in Ibadan and ICRISAT's Sahelian Centre in Niger to visit ILRI's outposted staff and their collaborators. In both Addis and Nairobi, members of the Panel called upon representative of the local NARS. Shortly after completion of the first phase, one member of the Panel resigned for personal reasons; he was replaced before the start of the second phase.

During the period prior to the Panel's return to ILRI, specifically to the Nairobi headquarters in February 1999, the Chair and one other member visited CIAT in Colombia, while others met with Institute staff at CIP in Peru and at research sites in Ecuador. In addition, a questionnaire was sent to 84 selected collaborators to solicit their evaluation of the partnership; approximately 40% of those solicited responded.

The Panel Chair and one member attended ICW'98 and met there with ILRI staff, Board members, and collaborators.

Although this is the First Review of ILRI, Panel members reviewed and considered the recommendations of the final reviews of both ILRAD and ILCA. Comments with respect to these recommendations are included in Appendix V and, occasionally, in the chapters of this report.

Following a final three weeks of consultation and evaluation, during which time chapter drafts were shared with Management to ensure factual accuracy, the Panel presented its report to Management and Board on 8 March 1999.

CHAPTER 3 - STRATEGY, PRIORITIES AND PLANNING

3.1 Introduction

Livestock research in the CGIAR is guided by the Group's overall policy, which was based on recommendations from TAC, to focus its animal commodity improvement activities to priority species of ruminants only, in particular cattle, sheep and goats. The CGIAR livestock research agenda is implemented through four major avenues: a) ILRI activities, b) activities of other CGIAR Centres, in particular CIAT, ICARDA, ICRAF, IFPRI, IPGRI and ISNAR, c) the System-wide Programmes on Livestock and on Genetic Resources, and d) Ecoregional approaches. Overall, the CGIAR allocates approximately 14% of its resources to livestock research, of which around 9% is currently assigned to ILRI.

Overall allocation to livestock research in the CGIAR declined substantially from 1990 to 1993. The ILCA and ILRAD budgets were reduced from a total US\$ 34.0 million to US\$ 22.1 million, during this period. This followed an overall trend of sharply reduced investments in the livestock development sector, following general disappointment with poor rates of return obtained from investments in livestock development projects during the seventies and eighties.

With particular reference to the CGIAR, there was growing frustration with the lack of evidence of direct farm level impact resulting from the activities of the former ILCA and ILRAD. In its 1993 paper on Priorities and Strategies for Livestock Research in the CGIAR, TAC stated that "*while CGIAR investment in livestock research has allowed for many achievements and generated a wealth of information useful to policy makers, TAC is concerned about the limited farm level impact on livestock productivity resulting from this investment*". The decision to set up a new livestock research institute in the CGIAR, in which ILCA and ILRAD would be integrated, and which would have a global mandate, was seen in that light. The new institute was to give greater emphasis to an integrated and holistic approach in the context of crop/livestock/agroforestry systems.

From the beginning of ILRI in 1995, its budget has been more or less stable, at about US\$ 25.0 million, and although resources have become more limited, ILRI's research agenda has widened. When ILRI was formed it acquired a large part of the previous ILCA and ILRAD research agendas, and in response to its new mandate began to engage in global activities. The ILRI decision to continue priority activities, with slight variations, made it difficult to reduce or eliminate ongoing projects.

In the sections that follow, the Panel provides an analysis of the ILRI strategy to undertake its mandate, its current priorities as well as its priority-setting and planning procedures.

3.2 The Strategy

The status of livestock research in the CGIAR has been a regular subject of comment and debate for more than 25 years. In 1992 a draft TAC discussion paper on Priorities for Livestock Research was discussed at International Centres' Week. Not long after, Winrock published a report, *Assessment of Animal Agriculture in Africa*. All of these studies and the discussions which resulted have played a role in looking more broadly at research needs in animal agriculture.

The original ideas and guidelines for ILRI emerged out of studies by the CGIAR and the Rockefeller Foundation. In March 1993 a CGIAR Working Group on Livestock Research issued a report that recommended "*a unified visionary strategy to guide future research, a revised institutional organization to implement future research, and a revised management structure to establish policies and provide oversight for future research, for sustainable livestock production*". In May 1993, a CGIAR Steering Committee on Livestock was asked to develop the unified strategy and programme. At ICW'93 in October 1993, the Rockefeller Foundation accepted the CGIAR request to serve as the implementing agency for the new institute. In August 1994, the draft ***Strategic Plan for a New CGIAR Global Livestock Research Institute*** was issued. In September 1994 at the inaugural meeting of the ILRI Board of Trustees the Strategic Plan was approved. In September 1996, the ILRI Board reaffirmed the strategic plan "as the guiding instrument for ILRI's plans and priorities".

The proposed programme in the 1994 Rockefeller Foundation report provided the rationale for a global initiative and suggested priority research areas for the new Institute. At that point this document was limited in the section on ***Implementing the Strategy***, yet it offered alternatives about how the CGIAR should manage the unified strategy. It was pointed out that the least difficult role for ILRI was the one in which the Institute would become a strong convenor of the global initiative. Another point highlighted the importance of co-operative links with NARS, which should include assistance in institution-building.

The ILRI 1996 Strategic Plan is essentially identical to the original Rockefeller Foundation report (Rockefeller Foundation, 1994), and does not appear to include any modifications or adjustments that might have arisen from numerous meetings and discussions with stakeholders following the report's release in 1994. The Panel noted that the Executive Summary of ILRI's Strategic Plan of 1996 begins as follows: "This report was commissioned by the Rockefeller Foundation acting on behalf of the CGIAR".

The 1996 Strategic Plan presented the seven research programme areas and their relative importance by regions of the world. The seven research programme areas were: Animal Health, Animal Genetics, Animal Nutrition, Feed Resources, Production Systems, Natural Resource Management, and Policy Analysis. The strategic choice was confirmed to limit ILRI's biological research commitment to ruminant species.

In its preparation of the first ***1995-97 Medium-Term Plan***, ILRI's research agenda accommodates projects from the inherited portfolio within six programmes (Conservation of Biodiversity, Production Systems Research, Utilisation of Tropical Feed Resources, Animal Health Improvement, Livestock Policy Analysis, and Strengthening Collaboration with NARS). Following Board and TAC approval of the ***Medium-Term Plan 1998-2000***, ILRI's research activities were organised in three programmes to implement this Medium-Term

Plan: Biosciences, Sustainable Production Systems, and Strengthening Partnerships with NARS (SPAN).

The 1996 Strategic Plan made it explicit that ILRI would be a demand-led organization responding to its stakeholders' needs and preferences. Also, from this document, four strategy elements were identified: co-operation with NARS, forming scientific consortia with other Centres, extending ILRI to worldwide coverage, and focusing the research in ecoregions. These elements are discussed briefly below.

Co-operation with NARS is a key element in the strategy, as it recognises the benefits of partnerships sustained by comparative advantages of the parties involved. As part of this initiative it was expected that ILRI would undertake the task of assisting NARS in improving their research capacity. This led ILRI into a number of activities that are included under its programme on Strengthening Partnerships with NARS (SPAN). By training national professionals in research issues and information management, their home institutions benefit directly. However, strengthening a research organization is a major task, requiring effective strategies, improved management, a good salary structure and enough resources. Therefore, besides focusing exclusively on the direct benefits of partnerships, ILRI's strategy should consider collaboration with ISNAR and other international development institutions to further strengthen livestock research organizations in developing countries. In this regard, the African Capacity Building Initiative deserves much attention.

Extending ILRI's worldwide coverage and working with a regional perspective is also an important - perhaps the most important - element of the strategy. The key issue is the distinction between a global responsibility (in certain functions) versus engaging in a worldwide research effort. This distinction is not clear in the current guidelines.

The new mandate challenges ILRI to respond to livestock research needs around the developing world, taking into account the variability in national capacities and particular country needs. Research issues in other regions were identified in the 1996 Strategic Plan; however, it is not clear that there is a justification for ILRI's involvement in such research, in terms of comparative advantage and clear, designated priorities.

The global mandate challenges ILRI to define how to undertake other activities (e.g., networks and information) in which it fills a need and has comparative advantage. Global responsibility becomes more difficult when a large proportion of funding is limited to specific sites and problems. Therefore, there is a strong need to clarify what ILRI will do with fewer resources in this context, which does not necessarily mean conducting research everywhere, even when specific problems are identified.

A recently prepared joint Board/Management document (February 12th, 1999), prompted by discussions with the EPMR Panel in September 1998, gives ideas on strategic principles. The document presents general principles and ten elements for a strategy. Its ten sections provide considerations in defining a strategy, yet additional work is needed to articulate clearly a research strategy and priorities for ILRI as an organization. The strategy must contain a clear statement of how to achieve objectives, in a particular timeframe. Hence, the strategy must be clear and pragmatic in order to guide key managerial decisions.

Because an ILRI Strategy should lay out not only a strategy for research, but also priorities for development of the organization, it is essential to reveal a vision as to where

ILRI sees itself over time and among research organizations. Important, well-articulated components of the strategy should include: clear definition of the pattern for growth and adjustment (beyond numbers), and utilisation of information systems as a key tool in dealing with worldwide tasks. It is also necessary to define criteria to select partners at all levels, for multiple reasons; and to define priorities for research projects in light of multiple actors' interests. Most important are the guidelines for programmes and projects regarding how to internalise environmental issues; for involvement in policy support to allow maximum use of research outputs; and for the inclusion of research topics regarding other ruminants important in poor households.

The above may appear to be 'details', but they are not. ILRI management has considered many of these issues, and work is underway regarding them, yet they do not appear in the ILRI Strategy. If concrete statements, explanations and guidelines were provided regarding these issues, it would be easier to conclude that ILRI has a Strategy. The Panel hopes this report will make a contribution to assist the Management and Board towards that end. The expectation is that ILRI staff, donors and partners will benefit substantially from a clear message as to where ILRI is headed and how it will get there. The process of preparing the *Medium Term Plan (2001-2003)*, now underway, provides an opportunity to clarify ILRI's strategy and its operational implications.

Before leaving this discussion of strategy, the Panel would like to call attention to a novel – potentially powerful – concept that ILRI introduces in its documents on “strategic principles” that of ‘platforms of essential capacity’. This concept is not yet defined by ILRI, but could, in the Panel's view, include such important aspects as “critical mass” as well as “core competencies in essential disciplinary areas” of science. If so conceived, the notion of “platforms of essential capacity” would be particularly attractive for a global Institute wishing to establish its long-term leadership in key research areas such as genomics, genetics and systems science.

Thus, ILRI's idea of ‘platforms of essential capacity’ could and should become a strategic tool in planning and carrying out research. However, a number of details concerning the operation and function of this concept need to be clarified, such as what would justify being considered a “platform”, how would one be composed, what fields (disciplines, skills) would be essential, how much capacity would be needed in a given field (including critical mass), and how could platforms be organised and managed? Also, how would ILRI decide areas of core scientific strength that would be enhanced and protected for the health of the Institute and its programmes?

Believing that ILRI has identified a potentially powerful concept in building essential areas of science planning and management, the Panel recommends that ILRI define and further develop its ‘platforms of essential capacity’, including such concepts as core competence in key research areas.

The Panel has suggested some possible “platforms” in Chapters 6 and 7 to start the process of further conceptualisation.

3.3 The Research Priorities

Within its global mandate, ILRI undertakes other functions besides research. These include networks, diffusion of information and training, with differentiated demands for such services in various regions. Also, the expected impact of ILRI involvement in such tasks can be different than that in research. Hence, priorities for all activities, as well as allocation of resources should be undertaken in a comprehensive way. This section deals primarily with research priorities, but other issues are also raised for consideration.

Currently, the ILRI research portfolio covers a wide array of topics in twenty-one projects, and within the projects are 71 operational projects (hereafter referred to as 'sub-projects'). This conglomerate portfolio, extensive as it may seem, is an indication of the Institute's research priorities. The large agenda puts pressure on ILRI to obtain funding to maintain its research portfolio. ILRI Management states that the budget of ILRI must be much larger, and that the current portfolio reflects the many issues in which they believe there is a clear need for research that justifies ILRI involvement.

Many factors contribute to defining the ILRI research agenda and the allocation of funds to specific projects and sub-projects. The factors include ILRI's CGIAR mandate, donor interests, the carryover of activities inherited from ILCA and ILRAD, other CGIAR Centres (through ecoregional consortia), interests of the staff and their international contacts, and the expressed needs of NARS. ILRI argues that its comparative advantage is important in defining its involvement in research. From the current portfolio it could be concluded that ILRI's comparative advantage has grown extensively; this is an issue for internal evaluation.

In its Annual Programme Meeting (APM) in September 1996, ILRI made an effort to assess its achievements over two decades; strengthen its vision; address its strengths, weakness and opportunities; and revise management practices. It also undertook a systematic quantitative assessment of its 20 projects in light of two criteria: Attractiveness (Potential Benefits and Ability to Exploit) and Feasibility (Research Potential and Capability). The final outcome of this exercise was captured in a Project Assessment Matrix that suggested priorities for ILRI's research. The results, however, were apparently not utilised: the *1998-2000 Medium-Term Plan* (Table 3) shows the actual and proposed allocation of resources for all projects for the period 1996-2000, and it is clear that the allocations do not always coincide with the priorities suggested by the Project Assessment Matrix. In the Panel's view the 1996 priority-setting exercise, despite the procedural reservations expressed by some staff, has much merit. The method appears to be sound and relevant, and the exercise deserves to be revisited.

The ILRI research agenda and the concurrent allocation of funds build in an iterative way. The base budget of a project is increased or not, depending on its success in obtaining complementary funding. The process begins with the preparation of concept notes, consultations with potential partners, consultation with donors, draft proposals, internal discussion, further consultations with donors, and draft of final project documents. In this process the original ideas and objectives may change somewhat to accommodate interested parties. In some cases, or more specifically, in some sub-projects of ILRI, there is a greater ability to deal with this iterative process, so that sub-projects get more funding. On the other hand, sub-projects that may have a higher priority in ILRI's agenda may be left out. Making an additional effort to match priorities, internal capacity and funding is a task for ILRI to address.

An argument for ILRI's involvement in livestock research is that it will generate public goods; however, in fact ILRI may become involved for several reasons. One may be that no private organization finds it profitable to engage in such research, which may in some cases indicate a lack of relevance or importance of the problem. On the other hand, public national entities argue that they do not address particular research problems because they do not have the funds, or alternatively, because the problem is common to many countries, they expect an organization such as ILRI to do it. In the former case, this might mean an IARC would be substituting for weak national programmes and may be conducting research that is site-specific and not relevant beyond a national border. This point must be addressed as it may be among the factors that drove ILRI to some parts of its current research agenda and its current portfolio of more than 200 partner organizations, without validating the benefits of such an extensive list.

Having recognised these needs and conditions, the issue for ILRI is to determine the most severe and urgent problems of livestock that justify international research. Also, ILRI must examine how taking on such problems will influence its research agenda, fulfilling functions related to its global mandate, and its budget structure and stability.

It must be pointed out that not all problems of livestock in developing countries are animal problems, not all require research, and not all have solutions. Many are human problems (education, culture, poverty, etc.) involving people who themselves may judge that some matters are not problems. Many problems have straightforward solutions that depend on government policies and investments, but for political or other reasons are neglected. This rationale is important to define a balanced involvement of ILRI in research and in encouraging policies to create conditions to allow the extension of solutions generated by research. If the latter are not in place, research may generate outputs that do not translate into outcomes and impact at the level of ultimate users.

For ILRI, other considerations in priority-setting and allocation of funds relate to how close projects are from generating solutions. Research projects by their nature have different maturity dates yet some may continue beyond maturity. Since 1995, due to a sharp decline in unrestricted funding, ILRI has closed research activities on chemotherapy and pathology for trypanosomiasis, dairy technology, cow traction, and vertisol management. However, given the importance of the issue, ILRI should undertake an in-depth analysis of expected delivery of all ongoing activities and make decisions regarding their possible closure, particularly in projects that have been in existence for a long time without delivery of usable outputs or outcomes. The Panel hastens to add, however, that this statement should not be interpreted to mean it places lower value on longer-term, strategic or basic research. Rather, the Panel supports strongly basic and strategic research that provides new ideas, methods, approaches, and developments that will help continue agricultural transformation, especially in the livestock sector.

On a related issue, the advancement of science and improvement of research methods change research priorities over time. This is the case of animal populations genetically resistant to diseases for which vaccines have been pursued for a long time without success. A vaccine could offer a solution and its use could be extended widely and more rapidly, yet it often takes a long time to develop vaccines and such research is high risk. On the other hand, a disease-resistant animal genotype could be generated faster. However, the speed at which

this genotype is made available to producers is often slow, and will largely benefit those with the resources to obtain it.

To assist in defining ILRI's research priorities, in 1996 a study was commissioned to Jacobsen and Norton to provide a quantitative technique based on economic criteria that were applicable to ongoing projects. The theoretical framework developed applied to projects that had collected similar data over the same period of time, a requirement that did not apply to ILRI projects. Also, the proposed methodology was not accompanied by an example, and the methodology has not been used by ILRI. The Panel concluded there are little, if any prospects for such methodology to be used to determine ILRI's research priorities.

Within the scope of its research priorities, ILRI is in the process of building a research agenda that allows adaptation to changing responsibilities as well as many forces. In such a process it risks widening the coverage and complicating its administration. Hence, there is need to clarify further needed mechanisms to define research priorities and to allocate resources for research and other activities, and thereby allow research and other outputs to be used more widely.

3.4 The Planning Process

Besides a strategy and a clear definition of priorities, an organization requires careful, productive planning and evaluation. Without this it can not appraise its achievements nor define relevant actions. The planning process at ILRI is carried out at various levels and is iterative, yet the system does not seem to provide the needed results.

Because of the intricate relations that influence the ILRI agenda, all units must be involved in planning and evaluation. For example, the preparation of projects and the search for external funds, referred to in the previous section, are part of the planning process, and should be understood as such by all staff. Also, the specification of requirements of laboratory services is a part of the planning. Thus, planning is everybody's business. The key issues are to do it properly and to use its outcomes, otherwise it is useless and a cause of frustration and disillusionment for the staff. This is particularly important in a research institution where the scientific and intellectual talent of the staff is its primary asset. Continuing but ineffective planning is a drag on a research institution, but when planning is done well, increased research output and enhanced job and career satisfaction of scientists can result. At the same time, the effectiveness of the institution is enhanced.

At the project and sub-project level, objectives, goals, activities, outputs and indicators are analysed and discussed by project and sub-project staff, following the logframe. Annual workplans are developed for sub-projects, consolidated into the Project workplans, and approved by Programme Directors. However, the assessment of outputs and achievements is not rigorously undertaken; neither is there a critical evaluation of prospects for final delivery of results. In this way projects and sub-projects are seen as continuous, rather than time-limited tasks.

The Panel was concerned that planning at ILRI is too budget-driven. The highest level decisions regarding plans take place at the Board Meeting. The Board approves the medium-term plan, which has been developed from information provided by Programme Directors. The budget receives major attention in discussions, and there is no analysis of

strategic planning, adjustments in the strategy, nor are major changes addressed to shape ILRI's vision and direction. The Panel concluded that budget constraints and funding anxieties do not leave room for discussion of strategic matters.

As per *ILRI's Programme Operations Manual*, the APM is expected to be "*an important part of the planning and evaluation process and provides the opportunity for peer review of programme activity. It is held in September each year and brings together programme staff from all sites to review the progress of on-going activities and discuss plans and ideas for new activities.*" The actual role of the APM, however, is somewhat puzzling, at least based on the September 1998 APM which the Panel attended. Since the APM is expected to focus on both the planning and review functions, it should require a meticulous analysis of project outputs and their quality, as well as outcomes. Also important is a clear assessment of how close projects are from delivery of results and expected outcomes. On the basis of the above analyses, programmes and projects can receive better guidelines for adjustment and final decisions can be made on the allocation of funds. Although the process is in place, inputs for the analyses and estimates of outputs do not fulfil the requirements. The Panel believes more rigour is needed at sub-project and project level.

Current guidelines require that planning begin mid-year, the results be reviewed at the APM, and workplans be agreed between programme staff, Project Co-ordinators and Programme Directors by December for implementation in January. The effectiveness of this planning is conditioned by several factors: timing, quality and utilisation being the most important. Regarding the timing, the current schedule seems appropriate. It is important as well to ensure that projects actually implement rigorously the guidelines for continuous evaluation and planning that allows them to make on-the-road adjustments during the course of the project, and to record the adjustments. This will make the annual planning and evaluation process more meaningful.

Regarding quality of planning, discussions with Project Co-ordinators reveal wide variability in the process, thus common rules and control mechanisms are needed. And finally, the Panel found evident needs to enforce planning and evaluation procedures that allow the measurement of the quality and output of research, and that are useful for adjusting resource allocation.

Considering, the need to orient livestock research more closely towards the requirements of rapidly changing animal agriculture in developing countries, and the need to define and operationalise ILRI's global mandate more precisely, The Panel recommends that ILRI revisits its vision, strategy, and priorities and redesign its planning processes to position the Institute compellingly at the core of the international animal agriculture research agenda.

In this process, ILRI is expected to develop a position with respect to biological research related to domestic animals other than ruminants.

CHAPTER 4 - GOVERNANCE, LEADERSHIP, AND ORGANIZATIONAL CULTURE

4.1 Board of Trustees

ILRI's Constitution stipulates a Board of Trustees of up to fifteen members. At present, there are fourteen, including representatives appointed by both the Kenyan and Ethiopian Governments and the Director General serving *ex officio*. The Board has made an effort recently to increase the number of women and members from the South. The former now number three (the only woman on the founding Board retired early to join TAC) and the latter five or 36%. Members serve staggered three-year terms and are eligible for re-election for a second term. Current and past members of the ILRI Board, which includes several who served previously with ILCA or ILRAD, are listed in Table 4.1.

Full Board meetings are scheduled twice a year, the Annual Meeting in Addis in September, a second meeting in Nairobi in April. The Executive Committee normally meets during each Board week and again in February. Occasionally, a Board retreat of one to one and a half days is called, as was the case in April 1998 to consider the implications of funding trends and uncertainties on the overall direction and health of ILRI.

A "Rules of Governance" document outlines Board procedures and other policies of interest to members, and the Chair makes a point of holding orientation sessions for new trustees. Furthermore, the documentation prepared in advance of meetings, the subsequent minutes and interim communications to Board members are comprehensive and, indeed, exemplary at ILRI. Discussions are reported in detail and a careful record made of what the Board refers to as "Continuing Resolutions," deliberations and decisions of the Board that have ongoing implications. Some of these pertain to Board matters, while others are in the nature of Institute policies that impact on staff actions and Institute operations. The Panel notes, however, that no mechanism has been put in place to translate the latter into promulgated policies, with the exception of the Personnel Policy Manual.

Since policies established by the Board over the years, particularly in the programme area, have not been made widely known, the Panel recommends that past policies be retrieved from the records and disseminated in such a way that they are available for reference as needed both by current and newly recruited staff, and that those approved in the future be similarly and promptly made known.

The Board is structured somewhat differently from the usual CGIAR practice. Although there is an Executive Committee and a Programme Committee with familiar terms of reference, two other Board standing committees function in new and interesting ways. The original Audit Committee was renamed the Finance Committee and given a much broader assignment, acknowledging that the financial health of the institution is of critical importance and that the financial environment has changed substantially over the last several years. The Committee now works with Management to propose financial plans for the strategic, medium-term and annual time frames, including use of the Institute's operating and capital

Figure 4.1 International Livestock Research Institute-Board of Trustees

Name	Gender	Position	Nationality	Main area of expertise	Current Board Appointments	Date first Appointment to Board	Date of expiration of current term	Eligible re-election term
Dr. Neville Clarke	Male	Former Executive Director, SAAESD Texas A & M	American	Veterinary Medicine/ Physiology/Research Management	Chair BOT, Chair EC, PC, FC, HRC	21 Sept., 1994	1999	Not eligible
Dr. John E. Donelson	Male	Distinguished Prof. Biochemistry, Howard Hughes Research Laboratories	American	Biochemistry	Member PC	March 1995	1998	2001
Dr. H. A. Fitzhugh	Male	Director-General, ILRI	American	Animal Genetics/ Research Management	DG Member EC, PC, FC, HRC	1 Jan. 1995	N/A	N/A
Dr. John Vercoe	Male	Consultant in Agricultural Research & Development	Australian	Animal Science/ Research Management	Chair PC, Member EC	23 Sept. 1998	2001	2004
Dr. Paul-Pierre Pastoret	Male	Chair, Dept. of Immunology and Vaccinology, University of Liege	Belgian	Immunology	Member PC	23 Sept. 1998	2001	2004
Dr. Margaret Gill	Female	Chief Executive, Natural Resources International	British	Ruminant Nutrition/ Research Management	Member FC	24, Sept. 1997	2000	2003
Dr. Ana Sittenfeld	Female	Associate Prof., Centre for Research in Cellular and Molecular Biology	Costa Rican	Microbiology/ Ecology	Chair HRC, Member EC	24, Sept. 1997	2000	2003
Mr. Cees de Haan	Male	Livestock Advisor, Agriculture Department, World Bank	Dutch	Animal Production/ Agric. Development	Chair FC, Member EC	21 Sept. 1994	1999	Not eligible
Ato. Getachew Tekle-Medhin	Male	Vice-Minister-Agriculture	Ethiopian	Agricultural Economist/ Administrator	Member PC	18 Sept. 1995	Host country representative	Host country representative
Dr. Amrita Patel	Female	Managing Director National Development Dairy Board	Indian	Veterinary Medicine/ Administration, Agric. Cooperation	Member	25 Sept. 1996	1999	2002

CODE:**EC-** Executive Committee**HRC-** Human Resources Committee**PC-** Programme Committee**FC-** Finance Committee

Name	Gender	Position	Nationality	Main area of expertise	Current Board Appointments	Date first Appointment to Board	Date of expiration of current term	Eligible re-election term
Dr. H. Jochen de Haas	Male	Division Head, German Ministry for Economic Coop. And Develop. (BMZ)	German	Animal Science/ Administration	Member FC	21 Sept. 1994	2000	Not eligible
Dr. Tetsuro Komiyama	Male	Consultant, Nippon Agric. Research Institute	Japanese	Animal Genetics/ Research Management	Member FC	21 Sept. 1994	2000	Not Eligible
Dr. James N Mwazia	Male	Director of Research Development, Ministry of Research	Kenyan	Public Health	Member PC	September 1998	Host country representative	Host country representative
Dr. Charan Chantalakhana	Male	Director of Animal Science and Dean, Kasetsart University	Thai	Animal Science/ Administration	Vice Chair BOT, Member EC Member PC	21 Sept. 1994	2000	Not eligible
FORMER BOT MEMBERS								
Mr. Michael Young	Male	Ecological Economist, CSIRO	Australian	Environment/ Ecological Economics	Former Chair HRC Former Member PC	18 Sept. 1995	1999 (resigned in 1997)	
Dr. N. Ole Nielsen	Male	Former Dean, Guelph University	Canadian	Pathology	Chair HR Member EC	21 Sept. 1994	1998	Not eligible
Dr. Vagn Ostergaard	Male	Director of Research, NIAS	Danish	Animal Science	Member HR	21 Sept. 1994	Deceased	
Dr. Georges Tacher	Male	Former Director, CIRAD EMVT	French	Epidemiology	Chair PC Member EC	21 Sept. 1994	1998	Not eligible
Dr. Lucia de Vaccaro	Female	Professor, University of Venezuela	Venezuelan	Agronomy	Former Chair HRC	21, Sept. 1994	1998- (resigned in 1996)	

CODE:

EC- Executive Committee

HRC- Human Resources Committee

PC- Programme Committee

FC- Finance Committee

reserves, as well as performing the normal audit functions. A Human Resources Committee carries out the tasks of the former Nominating Committee and, in recognition of the fact that ILRI's human resources are its most valuable asset, is actively engaged with Management in the development of personnel policies and procedures, consideration of staff compensation packages and special personnel issues as they arise. Recruitment difficulties in the light of concerns for family safety and resource uncertainties are cases in point. The Committee also maintains an ongoing relationship with the nationally- and internationally recruited staff councils.

The structure has the advantage of engaging all Board members in Institute concerns to a larger extent than is frequently the case, as the division of primary responsibility into three segments enables members to focus their full attention on details of their assignment. The Committees meet simultaneously after two days of full Board meetings, then report back to the full Board where a general discussion of the issues covered by each takes place.

In addition, the ILRI Board has made use of Joint Board/Management Ad Hoc Committees. These are concerned with specific issues and operate within a finite time frame. Examples include Resources for Core Programmes; Intellectual Property, Biosafety and Bioethics; and Preparations for the EPMR. The Committees have met both by electronic mail and face-to-face in conjunction with other meetings. In establishing these mechanisms, the Board reasoned that "there is both need and opportunity for a richer interface between Board and Management [than is traditional in separating policy from implementation] wherein both strategy and implementation are jointly considered, especially on topics of transcending interest." As indicated below, this approach raised questions among the Panel members.

In the Panel's view, this is a well-organized and well-selected Board, with most members participating actively in their assigned roles. It conducts a carefully designed and thorough evaluation of the performance of the Director General annually and assesses its own work and the performance of its Chair regularly. The current Chair is a strong leader who has an unusual capacity to recapitulate and summarise Board discussions clearly.

It is also worth noting that the last EPMRs of ILCA and ILRAD both contained recommendations relative to the respective Boards of Trustees. These were clearly taken into consideration and responded to positively by the group establishing the structure and procedures for ILRI's founding Board.

The Board carries out its fiduciary responsibilities with care and is especially protective of the Institute's financial reserves. Financial reports are provided to all members at the Board meetings and sent regularly to members of the Executive Committee. The Finance Committee meets annually with the Institute's external auditors. The Panel **suggests**, however, that the Committee add to its agenda a regular meeting with ILRI's Internal Auditor to approve his workplan and review his reports.

With respect to its responsibility for programme oversight, it is important to note that a good many members attended all or part of the week-long Annual Programme Meeting that immediately preceded the Board meeting in September 1998. However, the Board relies more heavily on CCERs, which it used initially to test the implementation plans for the new Institute, in carrying out this function. CCER terms of reference are proposed by Management and revised/adopted by the Board. Membership on the review teams is jointly

established between Board and Management, and both the Programme Committee and the full Board review the reports and Management's response and add a second response with the Board's interpretation, exceptions, reactions and guidance. The EPMR Panel comments on the CCERs held to date elsewhere in this document

It will also be noted elsewhere in this document that, despite evidence of good science in a number of areas, the Panel observed that ILRI has spread itself too thinly over too many activities, that its research agenda lacks focus, and that there seems to be an inability to make the needed strategic choices, either by Board or Management. In private conversations with the Panel, several members of the Board expressed these same concerns. The Panel must wonder, therefore, why the Board has not taken action to remedy this situation, as is the Board's clear responsibility. Careful analysis of programme options and decisive action is, in the Panel's view, an urgent priority. A Panel recommendation in this regard is in Chapter 3.

Attendance at the Board Meeting brought to light two other issues of concern to Panel members. The first is the fact that, although the Directors of Institute Programmes made presentations to the Board, the Director General did not do so in open session. The Panel believes that an overview of institute-wide concerns is appropriately the role of the DG and **suggests** that a "State of the Institute" presentation, expressing Management's consensus views and recommendations—based on principles laid down earlier by the Board or recommending new ones—be a regular feature of open Board meetings.

More importantly, the Panel found the line between the responsibilities of Board and Management unusually blurred. Implementation issues were raised that are appropriately within the prerogative of Management and about which Board members are not likely to have sufficient information to make a decision. On the other hand, Management's presentation to the Board seemed to invite such incursion into its prerogatives.

Because the line between the responsibilities of Board and Management appears to be inappropriately drawn at ILRI, the Panel recommends that the Board clearly focus on its policy formulation and oversight functions, and establish a sharper distinction between its responsibilities and those of Management.

A final point: in the course of the September 1998 Board meeting, the Panel noted how few staff members were in attendance at the open sessions, even those focusing on their own programmes. In point of fact, staff commented later to the Panel that they were not clear as to Board programme-related policies. As it is often the case that staff members can contribute some point of information, and as it is essential for staff to understand the perspectives of Board members, the Panel **suggests** that staff be encouraged to attend as observers whenever possible. Participation in meetings of the Programme Committee is especially important in the Panel's view.

4.2 Leadership

ILRI is led by a Director General who took office on January 1, 1995 as the Institute came officially into existence. He faced at the outset an enormously challenging task of merging two quite disparate centres. This has been accomplished with commendable success, especially in areas related to administration. Financial systems were combined in the first year, and a solid set of procedures for human resources management put in place.

Throughout the past four years, the DG has kept a close eye on ILRI's financial resources and responded promptly and well to funding circumstances that required him to increase project funding substantially. As noted elsewhere, that element of the resource base has expanded almost threefold. This has made it possible for the DG to defend the Institute's biotechnology brief by directing unrestricted core funding to significant activities of the Biosciences Programme. At the same time, ILRI's reserves have been held at a high level, which means the Institute is well protected in the short run.

Another challenge successfully overcome by the DG relates to ILRI's relationship with the Government of Ethiopia. Despite that Government's disappointment when the founding Board selected Nairobi as the headquarters site, the DG was able to negotiate a favourable agreement to continue the Institute's work in Addis Ababa and in other Ethiopian sites.

The DG is assisted by a management team consisting of the three Programme Directors, the Director of Administration, and the Director for External Relations. They co-ordinate their work through the Institute Management Committee (IMC), although the Committee meets relatively infrequently. This is due in part to the travel schedules of the members; in part, because two of the five are posted to Addis.

The comments that follow derive from the Panel's extensive discussions with a wide range of ILRI's staff and collaborators. To be sure, many different opinions were elicited, but Panel members believe that the evaluation presented is a fair statement of the consensus.

The Panel was interested to hear a comment from staff that the programme-related members of this group are more concerned with increasing the Institute's resources than managing those on hand. While a primarily external focus is not inappropriate in the case of Directors General, the problem arises at ILRI in the current Director General's apparent reluctance to delegate authority appropriately and to promote the concept of delegation within his management team. This results both in unnecessary delays and in the denial of authority concomitant to staff members' assigned responsibility.

More importantly, the Panel has made several efforts, without success, to prompt Management to express an operational vision for the Institute. Since the Panel's first visit, a Joint Board/Management Ad Hoc Committee has drafted a report on strategic principles for discussion at the forthcoming Board meeting, but, again despite prodding, it does not interpret those principles in operational terms. It never states, nor does the Director General in discussion, what research ILRI should promote in the biosciences or production systems or make clear what the Institute should not attempt to do, given its current resource base. The Panel, many members of the staff and several Board members argue that ILRI is trying to do too much in too many places with too few resources and thus that it lacks focus. This has led to a reduction of staff below critical mass in some areas and unduly curtailed operational funds. The Panel concludes that ILRI is attempting to retain a presence on more thematic platforms than is feasible under current conditions.

A potentially useful and appreciated priority setting process was carried out in 1996, but its findings were not pursued. Instead, despite substantially reduced resources, ILRI continues to retain most of the activities brought forward from ILRAD and ILCA. Furthermore, globalisation has been interpreted primarily as requiring the posting of staff in Asia and Latin America, which has depleted resources at headquarters, rather than as simply

assuring that the research focus is more globally relevant. Reportedly, the approach to globalisation has not been debated extensively with ILRI's scientific staff.

The Panel makes a number of suggestions with respect to the research programme in the chapters that follow. They may or may not represent the choices Management and Board would select. Above all, however, the Panel believes clear choices must be made if ILRI is to provide the leadership in global livestock research of which its staff is capable.

4.3 Organizational Culture

The Panel was impressed by the competence and commitment of ILRI staff, at every level, in both Kenya and Ethiopia. Despite inevitable differences of opinion about programme and concerns about compensation, staff in general say this is a good place to work. Separate staff Councils representing nationally- and internationally-recruited staff meet regularly with Management and with the Board's Human Resources Committee and are thus able to bring forward issues for discussion and, where appropriate, change, although never quite as rapidly as staff would like.

Clearly, the merger of ILRAD with ILCA involved the union of two different science cultures. This difference was characterised by the distance between a set of closely related disciplines focusing on basic biology and a set of applied disciplines linked to a focus on field issues and exacerbated by the retention of two sites. Although the Panel was told that there was little social or work-related interaction in the first years, this sense of difference seems to have abated, and there is more research collaboration. As is usual in CGIAR Centres, the gulf between the NRS and IRS is a bigger issue, but one that will receive the attention of ILRI's newly established Diversity Task Force.

A number of staff members participated in a training programme some months ago that focused on building teams, and this was well received and has had an impact. Additional training, partly on the art of supervision, is planned for this year.

Immediately prior to the Panel's arrival in Nairobi and with little time at hand, the IRS Staff Council Executive solicited response to a questionnaire that looked at job satisfaction, various aspects of management and the nature of the work environment. On a scale of 1 (low) to 5 (high), ten of the 37 respondents answered 3; twenty answered 4. Significantly, respondents came up with a number of suggestions for improvements in the environment and identified numerous instances of initiatives they had taken themselves to make ILRI a better place. Their responses seemed to the Panel to display a generally positive commitment. The most significant pleas, in the Panel's view, were for a reduction in micro-management, increased participation and more decisiveness in decision-making and prompt feedback on the reasons for the decisions made.

CHAPTER 5 - INSTITUTIONAL STRUCTURE AND MANAGEMENT

5.1 Introduction

The Panel has undertaken a critical analysis of the organizational structure of ILRI in order to determine whether it is functioning effectively in terms of its primary task of delivering high quality research outputs that lead to the improvement of animal health and production. To achieve the organization's objectives, the structure must facilitate effective, rational and decisive decision-making, including appropriate allocation of human and financial resources. In other words, a culture of excellence needs to be generated by Management, acting in concert with scientists and other staff. As one ILRI scientist remarked: "we need to be lean, mean and effective." This chapter will consider whether the current organization is well designed and managed in this respect and, if not, will recommend how it might be improved. Chapters 6 and 7 contain the discussion of ILRI's research that has influenced the Panel's consideration of the organizational structure.

5.2 Current Organizational Structure

The priorities laid out in ILRI's first Strategic Plan in 1995, discussed in Chapter 3, led to an initial structure of six programmes (Conservation of Biodiversity, Utilisation of Tropical Feed Resources, Animal Health Improvement, Production Systems Research, Livestock Policy Analysis, and Strengthening Collaboration with NARS). The concept of a project-driven structure was developed at that time in response to System-wide changes in funding and the introduction of a project-based Research Agenda "matrix", and the programmes sub-divided into 22 projects. Each programme was led by a senior scientist and each project by a project co-ordinator.

In 1997, the decision was made to reorganize the research programmes in order to achieve better integration between projects and provide a more co-ordinated approach to the implementation of the MTP.

The current structure of ILRI is illustrated in Figure 5.1. Six units, all headed by director-level staff, report to the Director General. Three are concerned with ILRI's research and research-related activities: Biosciences, Sustainable Production Systems (SPSP), and Strengthening Partnerships with NARS (SPAN), the latter programme incorporating networks, training and information services. In addition, there are the Directors for External Relations, charged with co-ordinating the Institute's fundraising and public awareness activities; Institutional Planning (currently vacant and discussed below); and Administration, comprising finance, human resources management, Information and Technology Services, and Administration in Nairobi and in Addis. The Directors of SPSP and SPAN are based in Addis Ababa, where the former serves as Resident Director for that campus, although his role is defined largely in ceremonial terms. The Director of Biosciences and all other corporate-level officers are based in Nairobi. All directors manage staff posted at both principal offices in addition to outreach sites.

ILRI's research and research-related activities are now defined in 21 projects. Biosciences comprises ten; SPSP nine; and SPAN one, divided into several sub-projects. Project 21 is the Systemwide Livestock Programme, reporting to SPSP. Each project is managed by a Project Co-ordinator who oversees the day-to-day execution of the research and reports to the Programme Director. The programmes are not consolidated with respect to location, but contain project components on both campuses as well as personnel in Latin America, Asia, and West Africa. This geographical spread presents a significant challenge to programme management. The Panel has considered this issue with some care and has concluded that there are a number of cases where the advantages of separation are clearly outweighed by the disadvantages. When the specific characteristics of a site are intrinsic to the research carried out there, the inconveniences of separation must be borne. However, when the separation does not have a clear rationale, the research would benefit by the interaction brought about by daily contact of the scientists. Subsequent chapters of this report recommend consolidation of several research thrusts at a single site.

The principal mechanism for co-ordination is the ILRI Institute Management Committee, referred to as the IMC. Chaired by the Director General, its membership includes all six directors, while the Chief Financial Officer and Human Resources Manager participate in meetings when matters for which they are directly responsible or most knowledgeable are on the agenda. The IMC meets more or less quarterly to provide advice to the Director General with regard to programme planning, co-ordination, and evaluation; the allocation of financial and human resources; donor relations and fundraising activities; Board Relations; and CGIAR and TAC interactions. Its meetings are minuted and, after approval at the next meeting, made available through electronic networks/email to all staff.

A Programme Management Committee (PMC) formerly brought together the Programme Directors, Director General and the Director of Institute Planning to focus on opportunities for collaboration across programmes but met only recently for the first time in many months.

Finally, an Administrative Management Committee (AMC) meets at least quarterly to assure co-ordination of the units reporting to the Director of Administration and to identify priority needs for financial, human resources, information technology and administrative services.

The position of Director of Institutional Planning is assigned responsibility for co-ordinating ILRI priority setting, planning, resource allocation, and evaluation for the Institute's three substantive programmes. Reporting to the Director General, the Director would provide a staff service, rather than exercising line authority over any aspect of the programmes. The Panel questions the effectiveness of this approach and has considered alternative ways to achieve the programme integration that was envisaged when ILRI was established.

5.3 Integration and Interaction

Clearly the creation of ILRI from two centres presented a significant challenge, firstly at the level of creating programme and project organizational structures to continue the research activities, secondly at the level of methods and approach to mechanisms for priority-setting and thirdly to address the question of how a series of diverse disciplines could

be integrated and mechanisms put in place to achieve maximum added value from strong interactions. It is important to consider the factors that are likely to promote as well as those that are likely to inhibit such processes before designing an organizational structure to optimise integration and interaction.

A number of the factors that promote integration/interaction are listed below:

- complementarity of expertise required to achieve common goals;
- knowledge of available expertise within the Institute and respect for other disciplines;
- acceptance of the mutual benefit of a multidisciplinary approach;
- identification with the Institute's goals rather than project or programme goals;
- reduction in internal competition for project-specific resources;
- rewards for interaction and integration;
- belief in a team-based rather than an individual-based approach;
- single site operation.

The inhibitory factors are essentially the reverse of those listed above, but a key inhibiting factor can be the organizational structure itself, which the Panel considers to be significant in this regard.

There are a wide range of options for achieving the optimisation of research output and impact, and it is clear that the issue of integration and interaction is an item that is high on the agenda at all levels within ILRI. Given the short time-scale since the creation of ILRI, it would be unrealistic to expect that full integration would have been achieved, and this is clearly the case. However, there is significant evidence of interaction between programmes and projects and of integration in the area of animal production and health (already initiated prior to the formation of ILRI). There is also an increased awareness of the aims and objectives of the different projects across the programmes.

5.4 Assessment

The current organizational structure of ILRI is relatively new and thus the views expressed here are given at an early stage in its evolution; however they should provide key pointers towards change during the next round of planning. The Panel has identified the following as key issues that need to be addressed if the Centre is to function optimally, achieve its goals more effectively and generate the expected excellence of output:

- A clear pathway of efficient and decisive decision making needs to be built into the structure that not only provides greater autonomy at different levels but also provides a scientific overview of the programmes and projects that is independent of the individual programmes. This has previously been undertaken by a Director of Research – a position that no longer exists.

- The management of some projects over two sites (Addis and Nairobi) is not justified in terms of research needs; it creates major problems particularly in terms of integration, co-ordination, and cost.
- Many of the research priorities identified require inputs from a range of disciplines with clear scientific leadership. This integration is inhibited by the current structure and leads to the conclusion that closely related projects with common aims should be merged.

The Panel **suggests** the following reorganization of ILRI's research and research-related agenda:

1. Animal Genetics and Genomics
Characterisation, conservation and use of animal genetic resources; and development of disease- and parasite-resistant ruminants.
2. Animal Disease Control
Molecular biology and immunology of parasitic disease, leading to the development of sub-unit vaccines; and new diagnostic tools for the improvement of disease control through an understanding of the relevance of different control strategies.
3. System Science, Impact, and Policy Analysis
Increasing returns to livestock research through systems and policy analysis and impact assessment.
4. Production Systems and Animal Nutrition
Improved nutrition and management of livestock and of feed supplies for greater productivity and net economic returns; characterisation and conservation of forage genetic resources; and improving productivity and sustainability of crop-livestock systems in various regions, including those under disease risk and smallholder dairy systems.
5. International Co-operation -
Training, information, networks, institutional partnership development, and the Systemwide Livestock Programme.

The Panel is less convinced of the precise allocation of activities between programmes three and four and recognises that various considerations might come into play that would argue for shifts that differ from those suggested.

The new programme structure that is proposed has multiple goals. It is aimed at facilitating interaction among scientists and teams, especially the exchange and maturation of keen ideas into research of the highest priority and quality, and improving the Institute's organizational capacity to facilitate these essential processes. Current projects in the Biosciences Programme would settle into three programmes: Animal Genetics and Genomics (Projects 1 and 2), Disease Control (Projects 3 to 7), and Production Systems and Animal Nutrition (Projects 8 to 10). Current projects in the Sustainable Production Systems Programme would settle into two programmes: System Science, Impact, and Policy Analysis (Projects 11 and 12) and Production Systems and Animal Nutrition (Projects 13-19). ILRI's

training, information, network, and institutional partnership development activities would be allocated, as well as the SLP, to the International Co-operation Programme (Projects 20 and 21).

The fundamental rationale at the project level behind the Panel's recommendation is to create cognate multidisciplinary programmes that address a set of related research goals with a cohesive and well focussed approach. Creation of the Animal Genetics and Genomics Programme would highlight this priority research theme as an area of excellent quality that merits expansion to enhance ILRI's reputation. This is a major area of potential growth that is attractive to donors and one that should capitalise on information generated from other mammalian genomics research. Creation of a Disease Control Programme would formalise and extend existing links among its component projects. This programme would foster an interactive inter-disciplinary¹ team that would tightly connect its laboratory-based work to research in the field and *vice versa*. It is indispensable that scientists in the projects advise each other so that coherent approaches, appropriate tools, and new control methods be developed in a context where need and feasibility are jointly considered. Creation of a Production Systems and Animal Nutrition Programme would fortify the intimate nutrition and feed management connections of Projects 8 to 10 with the crop-livestock projects in the current Sustainable Production Systems Programme, fostering inter-disciplinary links with other programmes in the same manner as previously mentioned. Creation of the Systems Science, Impact, and Policy Analysis Programme consolidates the entire continuum of ILRI's economics expertise, integrating it with natural resource management and environmental perspectives, to facilitate goals and impacts from the other programmes.

The Panel is recommending, at the project level, consolidation to achieve better synergy among activities, and, at the programme level, restructuring to facilitate a sharper focus and clearer research direction.

To ensure strong scientific leadership and incisive decision-making, the Panel recommends that ILRI modify its organizational structure to include the following elements (see Figure 5.2):

- i) A new office of Deputy Director General (Research) to act in the absence of the Director General, oversee ILRI's research agenda, take a primary role in planning and priority setting exercises, promote inter-programme collaboration, and provide independent analysis of the resource needs of research programmes. The DDG (Research) would also oversee the Research Support Units.**
- ii) The current research and research-related agenda consolidated into five programmes as follows: Animal Genetics and Genomics; Animal Disease Control; System Science, Impact, and Policy Analysis; Production Systems and Animal Nutrition; and International Co-operation.**

¹ The Panel distinguishes between inter-disciplinary and multi-disciplinary research. Multi-disciplinary work involves different kinds of scientific scrutiny at various sequential or parallel stages in a concerted research programme. However, inter-disciplinary research requires the team of disciplinary scientists to co-design research projects and their connections in constituting the overall programme, starting with the initial stage of planning.

- iii) **The programmes consisting of projects as at present, though with a different configuration (as proposed in Chapters 6, 7, and 8).**
- iv) **One unit -- the Office of External Relations -- in a staff relationship to the Director General to continue co-ordinating the Institute's fundraising and public awareness activities.**
- v) **No change in the responsibilities of the Administration department, which would retain responsibility for finance, human resources management, information technology services, and administration of both Nairobi and Addis campuses.**

The suggestions above do not imply that all heads of programmes should be at the director level. In fact, the Panel believes that there are too many staff at this level at present.

Attention also needs to be given to how these various units interact to create a unified organization that facilitates the effective performance of key Institute functions. These include strategic, medium-term, and annual planning; priority setting; resource allocation; and management of human and financial resources. In this regard, the Panel **suggests** that the current co-ordination mechanisms be adjusted as follows:

1. An Institute Management Committee (IMC) with a membership including the DG, the DDG (Research), and the heads of Administration and External Relations, with participation by the managers of finance and human resources as the agenda demands.
2. A Programme Management Committee (PMC) with a membership including the DDG (Research), the five heads of programmes and of the Research Support unit, with occasional participation by heads of projects.
3. An Administrative Management Committee (AMC) as at present with a membership including the heads of finance, human resources, information technology, and administration in Nairobi and in Addis.
4. An Institute policy that calls for regularly scheduled staff meetings at the level of programme and administrative unit.

The Panel believes that each of these committees should meet at least monthly to ensure that there is an efficient flow of information up and down the organization.

The Panel expects that the July 1998 document "Responsibilities and Authority for Institute, Programme and Administrative Management" would be suitably revised to reflect the proposed structure and co-ordinating mechanisms and that steps would be taken to ensure that there is commensurate authority and responsibility at each level.

Figure 5.1 Current Organizational Structure

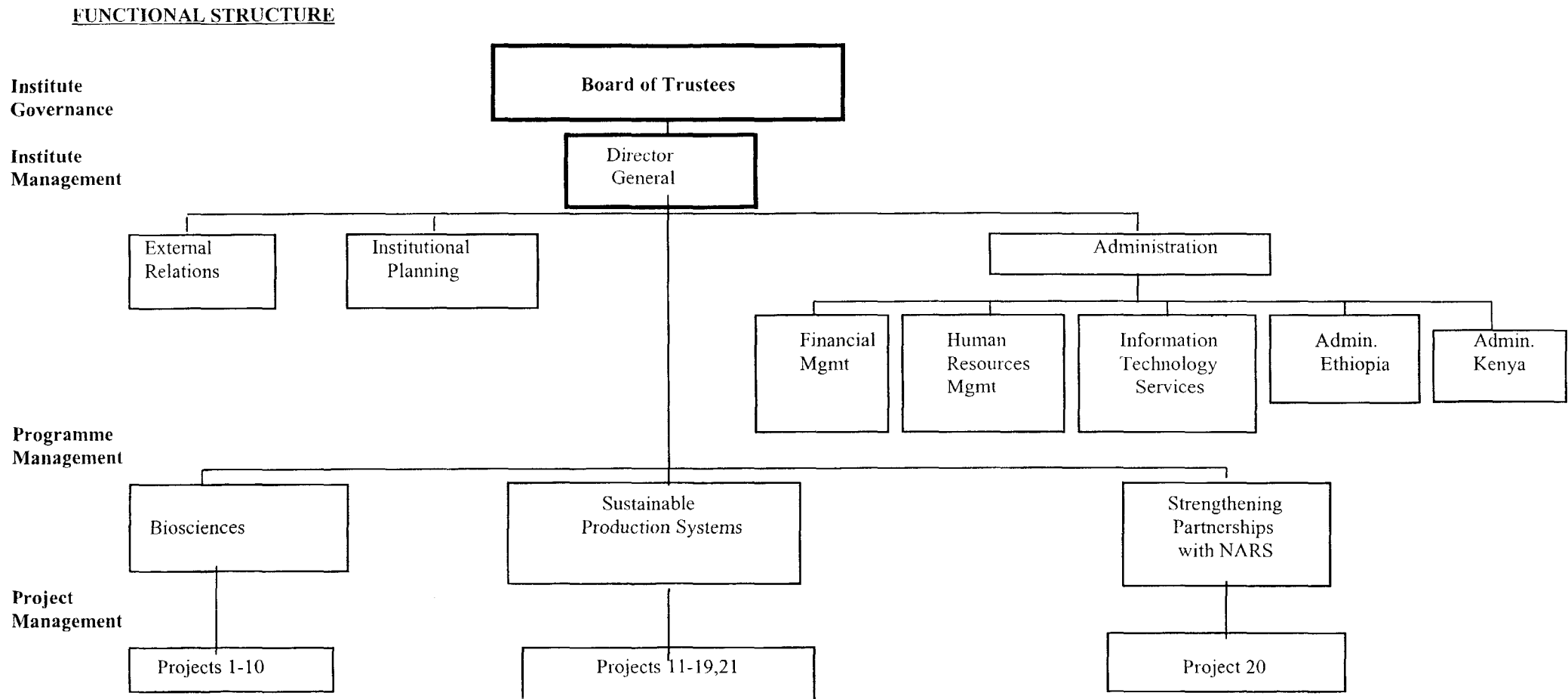
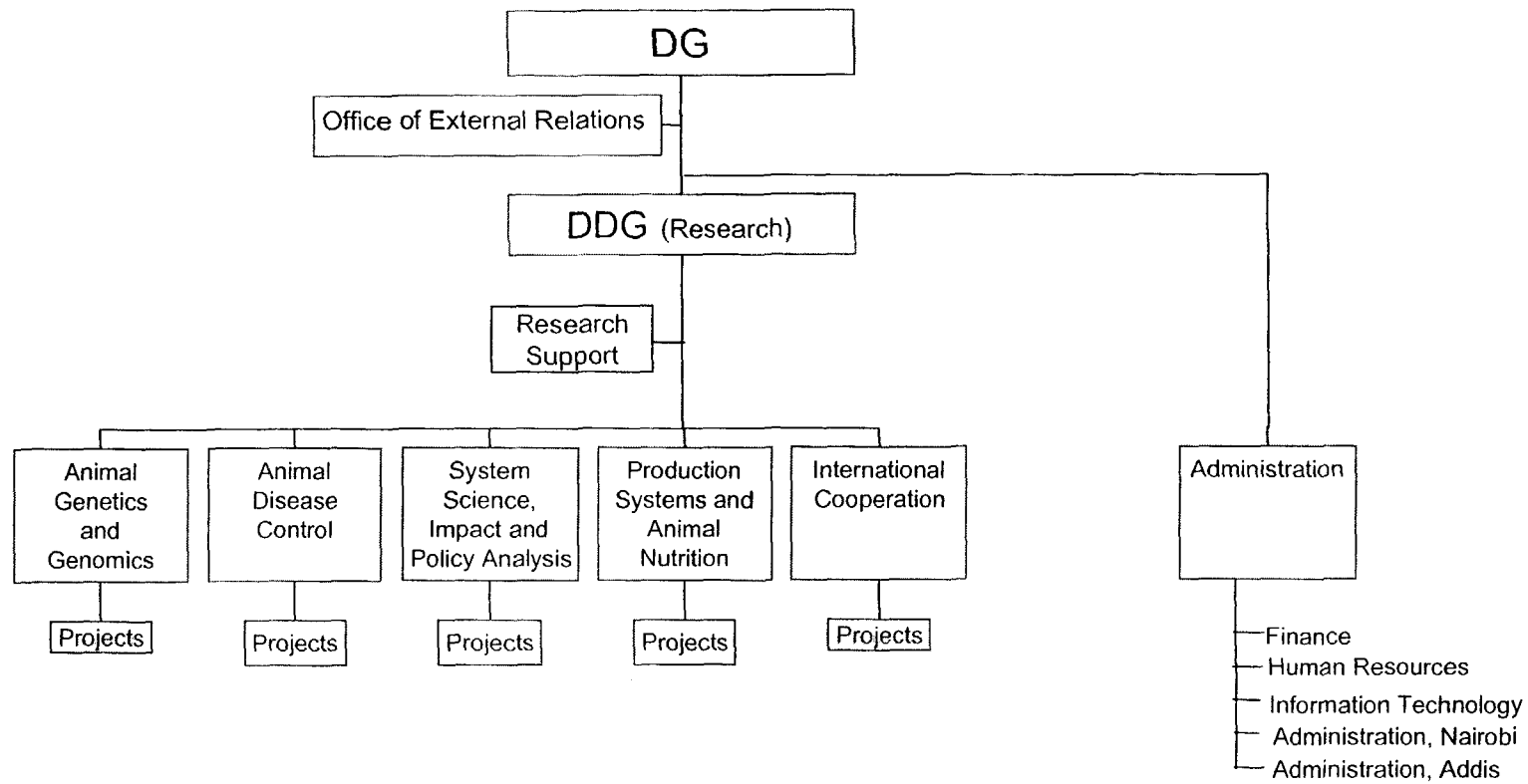


Figure 5.2: Proposed Organizational Chart of ILRI

CHAPTER 6 - BIOSCIENCES PROGRAMME

The Biosciences Programme is working at “paving the way” for a more productive tropical animal agriculture with a portfolio of new technical change products. In this programme, the sciences of genetics, genomics, immunology, parasitology, biotechnology, and nutrition are utilised to determine how to reduce animal losses by controlling key diseases, and to improve animal performance by improving nutrition with adapted feed resources. Details about the Biosciences Programme are in Appendix I.

6.1 Animal Genetic Resources

[Characterisation, conservation and use of animal genetic resources (Project 1)]

An essential step in any global strategy for the conservation of animal genetic resources is the development of methods of defining and documenting the available livestock and measuring their diversity and genetic relationships. Once such systems are in place the collection of information on a global scale can be initiated with the advantage that the data are comparable. The aims and objectives of this project are to identify the characteristics of livestock breeds as well as define biodiversity and identify unique populations where conservation measures are required.

6.1.1 Current Strategy

The research is aimed at defining the characteristics and extent of diversity in indigenous ruminants (cattle, sheep, and goats) by analysing phenotypes and defining genetic relationships using microsatellite markers. Considerable investment has been made in methodologies for collecting data as well as identifying appropriate genetic markers. The initial focus has been on cattle in sub-Saharan Africa with extensive involvement of NARS, analysis of existing published and unpublished data, and a collaboration with Trinity College Dublin. The research contributes to the identification of characteristics of livestock breeds that are useful in Project 2. Current and future strategies are aimed at extending and developing the same approaches for sheep and goats within Africa, as well as extending these approaches to Asian cattle. The research activities are appropriately focussed on Africa in the short term to assess effectively the methodologies and markers before expanding the analysis to Asia. The approaches and methodologies are of global significance.

6.1.2 Achievements

A series of significant achievements have been made and these include:

1. Compilation of data on the geographic distribution, physical characteristics and performance of indigenous cattle, sheep and goats together with the creation of a Domestic Animal Genetic Resources Database.
2. Development of methodologies to collect data on breed characteristics that can be applied elsewhere and can be analysed comparatively and pooled.
3. Identification and validation of a set of cattle microsatellite markers for genotyping.

4. Development of microsatellite markers for sheep and goats.
5. Identification of a Y chromosome specific marker that distinguishes *Bos taurus* and *Bos indicus* crossbreds.

As the focus of the research has been to develop methods of data analysis and the analysis and cataloguing of diversity, the main impacts are likely to be forthcoming in terms of defining breeds with increased disease resistance, and for assuring genetic diversity of domestic livestock for future use. Impacts have primarily been in terms of publications, advice on data analysis for breeding programmes being undertaken by NARS, and in worldwide recognition of the uniqueness of African germplasm from the cattle genome.

6.1.3 Future Plans

- On-farm phenotypic characterisation methodology to be fully available and validated for use by NARS.
- Domestic animal genetic resources database to be fully developed and available.
- Microsatellite markers for sheep and goats to be established and used to define the African breeds.
- Initiation of work on the genetic relationships in Asian cattle.

6.1.4 Assessment

This is a well-conceived project which readily integrates with a global mandate. The methodologies, data and the database constitute unique resources that will be accessible by NARS and ARIS and will provide invaluable information for breeding programmes, conservation strategies and future research projects. The high degree of integration with project 2 is commended. It is important that the project maintains the focus on African breeds to fully validate methodologies and tools before applying these to other breeds elsewhere in the world. This is a high priority project but it seems to have a relatively low profile internationally; this should be addressed. The relationship of this project to the FAO conservation of genetic resources programme should be clarified and it is **suggested** that ILRI should play a more significant role in this programme. This project involves a high level of involvement, especially through the NARS-ILRI livestock networks in eastern and southern Africa, in the collection of data and will ultimately be of benefit through the definition of breeds suitable for production.

6.2 Development of Disease-Resistant Livestock (Project 2)

[Genetic resistance to trypanosomosis in cattle and mice;
Genetic resistance to gastro-intestinal parasitism in small ruminants]

6.2.1 Current Strategy

This genomics research is aimed at developing and testing genetic markers for resistance to trypanosomosis in cattle and helminthosis in sheep, and to incorporate this information into breeding programmes to improve net productivity. Indigenous sheep and goat breeds in Africa and Southeast Asia are also being evaluated for resistance to

gastrointestinal parasites; and integrated endoparasite control strategies are being developed. These complementary efforts are appropriately supported by research with laboratory mice to facilitate gene discovery through DNA-sequence comparisons between species. Once identified, genome regions influencing disease or parasite resistance can be incorporated into selection programmes using marker assisted introgression.

Research activities, involving top-flight scientists from several collaborating institutions, have been 1) to establish an F₂ resource population of cattle resistant to trypanosomes, 2) to establish nucleus flocks and backcross sheep families and a mouse population in which to search for markers and genes, 3) to evaluate breeds and their crosses under parasite challenge and dietary alternatives, and 4) to develop appropriate statistical methods for marker assisted introgression and to quantify infection and productivity responses in a repeated measures design.

6.2.2 Achievements

Three unlinked quantitative trait loci (located on different chromosomes) for trypanotolerance have been located in mice, which are the first narrow QTL definitions associated with an important disease in a mammalian genome. Three QTL marker-regions for trypanotolerance have been identified in cattle, which is a milestone towards developing a DNA-based diagnostic test for this trait. Better-adapted (parasite resistant) breeds of sheep and goats were shown to be at least twice as productive as the susceptible genotypes. This was an important step in valuing adapted animal genetic resources. Milestones meriting commendation include 1) the location of multiple QTLs for disease resistance in cattle, 2) that identification of candidate genes for disease resistance is imminent in mice, and 3) the establishment of resource populations of resistant cattle and sheep.

6.2.3 Future Plans

- Continue the search and mapping of disease resistance genes, including comparative mapping of cattle QTL regions with mouse and human.
- Design a breeding plan for marker assisted introgression of loci determining trypanotolerance in crossbred cattle.
- Continue evaluation of endoparasite resistance and development of unique animal resources for genetic research, and test integrated control strategies for sheep and goats.

6.2.4 Assessment

The Panel commends researchers for the “cutting edge” science of this project, which has attracted to ILRI’s agenda world class scientific collaborators from numerous outside institutions. These outstanding efforts to integrate molecular and quantitative genetics techniques are at the forefront of mammalian genomics research. They hold promise for reducing losses by adding to breeding options some of the major genes affecting these important maladies, which should also enhance management options (health control, nutrition) to improve productivity in the target environments. Further assessment of interaction with management alternatives is encouraged. The Panel **suggests** that all candidate helminth-resistant genetic material (breeds, genes or markers) be comparatively

evaluated, preferably at two locations. At least, a reference breed's germplasm that is common to both locations (i.e., transferring it by embryos or semen) should be incorporated into the research design to enable comparisons.

Progress in ruminant genetics research at ILRI is currently constrained by two factors. First, it has been slowed in both projects by the delay in refilling the co-ordinator position for Project 2, which was vacated in April 1998. Efforts should be redoubled to fill this vacancy. Second, important synergies and research progress are being sacrificed because the collaborating scientists in the two genetics projects are divided between the campuses; this also reduces the efficiency of resource use. Repeated feedback from ILRI scientists confirmed these assessments.

To ensure research quality and productivity by having project co-ordinators and their research teams work together on a daily basis and thereby achieve cross-fertilisation of ideas, catalyse critical thinking, and design cutting-edge research and research proposals, the Panel recommends that Project 1 (Characterisation, conservation and use of animal genetic resources) and Project 2 (Development of disease resistant livestock) be managed at the Nairobi campus.

The Panel *urges* that ILRI move swiftly to continue establishing itself as a leader in genomics research on the livestock diseases that are important in developing countries, and to solidify linkages with key institutions. This would require greater investment and a larger core of researchers in this area. Besides shifts in existing resources, ILRI should approach other key genomics research institutions, like the Agricultural Research Service of the US Department of Agriculture. The ARS is increasing funding for genomics research, and has recently established a new centre for Bioinformatics and Comparative Genomics to analyse genebanks resulting from various gene-sequencing projects using rapid DNA sequencing.

6.3 Disease Control and Diagnosis

[Molecular basis of pathogenesis and disease resistance (Project 3), Immunology and vaccine development (Project 4), Improving livestock productivity through development of sub-unit vaccines (Project 5), Development and application of diagnostic tools in disease control and surveillance (Project 6)]

6.3.1 Current Strategy and Approaches

This research is primarily strategic but with downstream goals and is essential if biological control measures are to be developed. The work focuses on different aspects of disease control, but primarily on the development of vaccines and improved diagnostic tools using modern molecular and immunological approaches with *Theileria parva* (ECF) and *T. congolense*/*T. brucei* as the prime target parasites. Additionally more basic research on both parasite and host genes involved in immunosuppression, pathogenesis and host resistance are being undertaken together with fundamental studies on immune mechanisms.

A number of strategies for defining antigens capable of inducing a protective response have been taken based on rational considerations of likely target antigens (*Theileria* sporozoite surface antigens, *Theileria* macroschizont molecules identified by sequence analysis, the flagellar pocket antigens of trypanosomes and genome analysis of *T. brucei*) and on assay systems derived from the protective mechanisms (CD8⁺ cytotoxic and CD4⁺ T-cells recognising *Theileria* macroschizont antigens). Once such antigens have been identified, the

genes encoding them are sequenced, expressed in a variety of recombinant expression systems and these products are used in laboratory and, ultimately, in field-based vaccine trials.

The strategies for developing diagnostic assays for *T. parva*, *T. mutans*, *Babesia bigemina* and *Anaplasma marginale* have been based on identifying conserved immunodominant antigens (either in-house or through collaboration), cloning and expressing the genes encoding such antigens and then developing ELISA based assays. In addition standard approaches for PCR based diagnosis and the use of polymorphic markers for strain identification in *Theileria* have been undertaken. Similar strategies have been taken to diagnose trypanosome species, although a DNA based ELISA format has replaced the antigen based ELISA. Strategies have also been developed to produce methods for identifying drug-resistant trypanosomes with a specific focus on isometamidium.

A diverse set of strategies has been undertaken to identify parasite molecules mediating immunosuppression, pathogenesis, parasite cell death and novel chemotherapeutic targets as well as a collaborative project aimed at identifying the basis for resistance in Cape buffalo and eland to trypanosomosis infection. The common theme to these sub-projects is to identify molecules of either host or parasite origin that modulate the growth and pathogenic consequences of trypanosome infection.

6.3.2 Achievements

These are considered in relation to sub-sections outlined in 6.3.1, namely: vaccines/immune mechanisms, diagnostics/molecular markers and modulation/pathogenesis of infection. In general significant achievements have been made with the development of diagnostics, the single antigen vaccine against *T. parva*, the delineation of immune mechanisms and the identification of congopain as a mediator of trypanosome pathogenesis. Furthermore, the receipt of the Chairman's Award for Best Outstanding Young Scientist is a credit to the programme. The remaining areas show promise but are at an early stage, which makes it difficult to assess their potential impact at the present time.

The sporozoite antigen, p67, from *T. parva* was identified as inducing a protective response under laboratory conditions at the time of the last EPMR review of ILRAD (1993). Achievements since that time have been to test extensively the p67 antigen using a variety of delivery systems, and show that >70% protection can be achieved with a LD₇₀ challenge under laboratory conditions. A single field trial resulted in 25% protection; this lower level may reflect the unanticipated adverse conditions experienced during the trial. Since the demonstration by ILRI scientists that cytotoxic T-cells generated against the macroschizont stage of the parasite can confer protection, it is clear that the identification of the parasite antigens involved is a high priority. A number of candidate antigens have been isolated.

The prospect for a vaccine against trypanosomosis is debated among the scientific community in terms of feasibility. In collaboration with scientists from France and Belgium, it has been shown that an antigen (congopain) can reduce the pathogenic consequences of infection while a crude sub-fraction of trypanosomes can induce 100% protection against infection in mice. More recent studies have begun to identify the mechanisms of immune suppression in *T. congolese* infections and have demonstrated clear differences in responses between trypanotolerant and susceptible breeds of cattle. The potential impact of these findings is high, but further research effort is needed to assess this fully.

Serodiagnostic tests for four tickborne diseases have been developed and fully validated in both Africa and Asia. ELISA based kits are currently being distributed to NARS. A set of PCR based diagnostics have been developed for the three main trypanosome species infecting cattle as well as dot blot assays for their detection in tsetse flies. The PCR assays for *T. brucei* and *T. vivax* have been converted to an ELISA format. In collaboration with scientists from Glasgow, an ELISA based kit for measuring isometamidium levels in cattle has been developed and validated as a rapid indirect test for the occurrence of drug resistance. The whole range of tests will have significant impact as both research tools in epidemiological studies as well as for routine diagnosis, although the latter may require the development of pen side tests and formats suitable for use by NARS.

A series of molecular reagents have been developed in both *T. parva* and *T. brucei* which have been used to develop a detailed restriction map of *T. parva*, provide a series of markers to define strains of *T. parva* and initiate the characterisation and identification of drug resistant *T. congolense*. Additionally some 4,000 expressed sequence tags have been sequenced as part of the WHO trypanosome genome project and will be used by the worldwide trypanosome research community for basic research and drug discovery.

Collaborative research with labs in The Netherlands and Scotland has been directed at identifying the molecular basis for cell death of trypanosomes. These projects are essentially at a descriptive phase, but have identified a number of key molecules likely to be involved including a 'secreted' factor causing trypanosome cell death

6.3.3 Future Plans

This is a large programme composed of four separate, but interrelated projects leading to a significant number of future aims and plans, which can be summarised as follows:

Vaccines and vaccine development

There are three component plans, firstly to test the existing p67 *Theileria* vaccine and develop/identify further antigens to include in a multi-component vaccine; secondly to develop further immunological approaches for defining immune mechanisms, protective antigen identification and antigen delivery for vaccines against ECF and trypanosomiasis as well as and collaborative evaluation of a vaccine against cowdriosis; and thirdly to define protective and anti-'disease antigens' for the development of a trypanosome vaccine.

Diagnostics and markers for drug resistance

Further development of tickborne disease and trypanosome diagnostics to include simpler tests and markers for drug resistance and strain identification. These will provide the tools for epidemiological analysis, vaccine trial monitoring and more effective diagnosis.

Pathogenesis and disease resistance

The research plans are somewhat diverse and include investigation of the mechanisms of trypanosome cell death, the basis for wild game disease resistance and the identification of molecules mediating immunosuppression in trypanosome infections.

6.3.4 Assessment

This is a broad-ranging portfolio of projects clearly aimed at developing a range of different control strategies against both tickborne diseases and trypanosomosis. The projects have evolved since the last ILRAD EPMR away from basic molecular and biological research towards more applied goals. It is critical that ILRI maintains a strong base in biotechnology and basic research and the expertise to partner new initiatives in the genomics of parasites so that they are in a position to exploit the fruits of gene discovery in the post genomics era. In this context, such expertise will be critical in exploiting the information derived from the proposed *T. parva* genome-sequencing project, however it is important that the research resulting from such information is of high quality and is focussed.

As the research portfolio has shifted towards more downstream objectives (vaccines and diagnostics) the quality of output has to be judged by different criteria to those largely based on purely scientific considerations. The CCER (1996) report largely endorsed the current projects but provided limited comment on the quality of the work although it suggested the need for consultation in the area of trypanosome diagnostics. The report also recommended expansion into vector-parasite interactions and the coverage of further diseases. The Panel does not endorse this view as there is a need to focus both the resources and the science. The output of the research has been reasonable and Project 6 has developed an array of PCR and ELISA based diagnostics that is commended although consideration needs to be given to the most suitable formats for routine use.

Vaccines are clearly an ideal approach to the control of trypanosomosis and theileriosis as well as other tickborne diseases. However, vaccine research is high-risk, long-term and resource-intensive with organisms as complex as parasites. The issues that face the future development of this research area are severalfold and these need to be addressed with urgency if successful delivery of new control measures is to be achieved

In the MTP (1998-2000, table A2) an *ex ante* impact assessment of vaccines against ECF and trypanosomosis suggests that these will take a further 6 and 10 years research respectively (assuming a 50% probability of success) and both have a high benefit to cost ratio. Considering the ECF vaccine, it seems unlikely that the single (p67) antigen is going to provide full protection under field challenge, highlighting the need to focus on further candidate antigens. The slowness in undertaking the field trials of the p67 vaccine are a major criticism as well as the lack of a major effort to identify additional antigens to other stages of the parasite. The available evidence strongly suggests that a vaccine is feasible albeit in a longer timeframe than 6 years from 1996 when the analysis was undertaken. The Panel **suggests** that this project area needs to be critically evaluated in terms of its focus and strategies with the development of stringent criteria for making 'go/no go' decisions on particular antigens and approaches so as to avoid resources being expended on non-productive lines. Furthermore, it is critically important that the p67 ECF vaccine is tested extensively in field trials as soon as possible. Reorganization of the project structure is **suggested** in order to integrate the disciplines of immunology and molecular biology under a single leadership

The relative value and feasibility of different approaches to the control of trypanosomosis needs to be evaluated either internally or by external consultation given the questions surrounding the feasibility of developing a vaccine against the bloodstream stage of the parasite where natural immunity is rare in contrast to the situation with theileriosis. What

are the relative merits of vector control, chemotherapy, or the development of a transmission blocking vaccine? How feasible is it to deliver a vaccine, with the available resources, in a ten-year time frame? To suggest that there is a 50% probability of success is optimistic at this stage of the research.

Consideration needs to be given as to when the research on diagnostic tools has achieved its goals and can be concluded. A number of tests have been successfully developed for tick borne diseases and for defining *Theileria* strain diversity. Is this an end point? Clearly further research is warranted on developing species specific tests for trypanosomes that can be used in both the vector and the host with subsequent use in epidemiological analyses. Evaluation is required of the future need for diagnostic tests and whether effort should be put into diagnosis of other diseases of relevance outside Africa. Similar considerations apply to the development of tests to detect drug resistant trypanosomes as well as the issues of the cost and the relevance of the need.

The research on disease resistance and pathogenesis has some promising and interesting data in the areas of disease resistance, molecules mediating pathogenesis and immunosuppression, the mechanisms of trypanosome cell death and a new potential target for chemotherapy. The research on congopain (anti disease antigen) should be followed through to a definitive evaluation of its efficacy so as to determine its practicality as a product. There is too large a portfolio of projects and too great a breadth of topic to make substantial progress in any one area. On this basis it is **suggested** that the research areas be prioritised and a number sidelined so that this project area has a high probability of making a significant impact.

Because the slow pace and past unrealistic timescales have led to a lack of credibility in the area of ILRI vaccine research, the Panel recommends that the research on vaccine development (ECF and Trypanosomosis) be critically reviewed with the aim of clearly defining a strategy and programme for developing further antigens for the ECF vaccine and evaluating whether a vaccine against trypanosomes is a viable prospect.

6.4 Epidemiology and Disease Control

[Epidemiology and disease control (Project 7)]

This project starts from the premise that control strategies and technologies are often inadequately or incorrectly applied because of a poor understanding of disease epidemiology and the need to define the relative merits of available control options under different situations. Thus it critically underpins the animal health area and is an important source of information for determining priorities in the Biosciences Programme. The initial focus was on vector borne haemoparasites but this has been broadened, as a result of external funding, to include studies of heartwater and rinderpest.

6.4.1 Current Strategy and Approaches

The prime focus of the project is on the epidemiology of vector borne diseases of ruminant livestock and the effect of different control interventions. Four main strategies are being undertaken: 1. The development of a theoretical framework based on conceptual models, mathematical models and geo-referenced databases supported by experimental and

field epidemiology (tickborne diseases and trypanosomosis). The framework will focus on the use of vaccine technologies in the case of tick borne diseases and chemotherapy in the case trypanosomosis. 2. Evaluation of the intervention technologies through clinical field trials. 3. Generic impact assessment techniques are being developed to apply to other diseases in relation to regional trade. 4. Investigation of the pathways for delivery of animal health technologies in systems where veterinary provision is now largely in the hands of the private sector.

A considerable proportion of the research will be carried out in collaboration with a number of ARIs. The aim is to provide improved disease management and control strategies to improve income generation and alleviate poverty. The project has good and extensive links across the Biosciences project portfolio.

6.4.2 Achievements

The achievements can be divided into three areas: heartwater, rinderpest and trypanosomosis/East Coast Fever. Projects have been completed on rinderpest and heartwater and have provided important and valuable analysis of the economic impacts of the Pan African Rinderpest Campaign and an evaluation of the infection dynamics of heartwater in different production systems in Zimbabwe. This has led to a detailed impact assessment of heartwater and the development of a model to evaluate the effect of different control options and their economic viability. This study is currently being extended to the SADC region (5 countries), in collaboration with the University of Florida, as well as identifying field sites for the evaluation of an inactivated tissue culture vaccine.

In the area of trypanosomosis, an expert system for evaluating chemotherapy options has been developed, a belief network approach to create a cattle disease diagnosis system achieved and a detailed study of trypanocide resistance in Uganda completed. A similar approach to that taken for developing the chemotherapy options has been taken to develop an expert system for the control of ticks and the management of cattle to minimise the impact of tick borne diseases.

It is clear that this project is highly productive and has developed a series of tools that both allow the analysis of the impact of different control strategies as well as putting these into effect to define the impact of specific control programmes. The continued development of these systems will be enormously valuable in advising other areas of the Biosciences programme in terms of the relative value of different control technologies.

6.4.3 Future Plans

Essentially these are to carry on the strategies and approaches outlined in 6.4.1 and extending the approaches described into the evaluation of delivery and adoption pathways for new disease control technologies.

6.4.4 Assessment

This project is of good quality and has produced a reasonable output both in terms of good scientific publications as well as advice, impact analysis and methods for evaluating different control strategies. The Panel commends the progress in this project and supports its continuation. This project illustrates how interaction between projects can provide added

value. It is strongly suggested that the area of trypanosome control strategies should be extended to consider the relative importance and likely impact of different control methods and evaluate whether investment in trypanosome vaccine research is warranted.

6.5 Ruminant Feed Resources

[Feed utilisation improvement for improving livestock productivity (Project 8);
Rumen microbiology for feed utilisation enhancement (Project 9);
Characterisation and conservation of forage genetic resources (Project 10)]

6.5.1 Current Strategy

This set of closely related topics is aimed at alleviating the nutritional bottleneck on ruminant productivity with better diets comprising crop residues and forages, including multipurpose trees and shrubs. Primary topics include 1) strategic dietary supplementation to improve digestion rate, feed intake and microbial protein supply, which involves assessing feed nutritive value to identify better-quality dietary ingredients, 2) utilising exotic rumen microbes, based on their fermentation and detoxification properties, to overcome anti-nutritional factors in forages from trees and shrubs, and 3) to characterise and evaluate forage germplasm to identify adapted genotypes for feed use. A related objective is to conserve forage diversity and disperse disease-free seeds from superior cultivars.

6.5.2 Achievements

Animal productivity increases with dietary improvement using forage legumes have been quantified; and whole-farm responses to management of nutrient transfers from multipurpose trees for feed and mulch and from manure have been measured. Forage germplasm resources, especially *Cynodon* species and accessions of *Sesbania sesban* have been morphologically characterised; and molecular characterisation revealed high differentiation among populations of *S. sesban*. Nutritive values and genetic marker information have been combined to identify high grain-yielding sorghum and millet genotypes with higher quality residues for feed. This was an inroad towards optimising varietal inputs for more productive crop-livestock systems; farmers were rejecting higher grain-yielding varieties because of low feeding quality of residues. These achievements portend greater net economic returns by managing nutrient flows in farming systems.

Rumen microbes that tolerate the anti-nutritional factors in *Acacia angustissima* were successfully transferred to animals with unadapted rumen ecologies, thus enabling them to avoid mortal toxicity when first introduced to this forage.

Collaborative contributions with ecoregional efforts in nutrition management and nutrient cycling resulted in ILRI's notable publication (1995), *Livestock and Sustainable Nutrient Cycling in Mixed Farming Systems of sub-Saharan Africa*.

6.5.3 Future Plans

- Characterise and evaluate feeding value of tropical forages to improve nutritional status and productivity of ruminant livestock using standard chemical methods and near-infrared spectroscopy.

- Improve animal performance through dietary supplementation strategies using tree forages.
- Collaborate with plant breeders to improve nutritive quality of sorghum and millet residues using QTL markers.
- Evaluate tannin-degrading capabilities of rumen microbes to improve nutritional status, including their molecular characterisation.
- Identify plants with anti-protozoal activity to reduce bacterial predation and potential reductions in nutrient flow from the rumen. Identify the anti-protozoal agents in *Sesbania sesban* and *Enterlobium cyclocarpum*, and quantify the effects of rumen defaunation on animal productivity.

6.5.4 Assessment

Adjustments in research focus are needed to increase the likelihood of reducing nutritional restrictions on the productivity of ruminants and farming systems. Farm-level impacts in various crop-livestock systems would be enhanced by shifting emphasis to systematic evaluation (chemically, near-infrared spectroscopy, *in situ*, *in vitro*) of the nutritive values of optional plant germplasm and their interactions across locations, including inhibition by secondary compounds (e.g., assaying for tannins). A global feed resources library, or database, containing this information and results from screening studies (including plant QTL markers) would enable study to identify promising dietary options for alternative farming situations (and to quantify the expected differences between them). Such a database would also help determine the *best-bet* forage grasses, herbaceous and tree legumes (where collaboration with ICRAF would be mutually beneficial), and crops for cultivation in different agroclimatic conditions (e.g., soils, rainfall and temperature). Better understanding the mechanisms controlling dietary supply and utilisation of nutrients, using animal trials to evaluate them, would help determine nutritional *recommendations for farmers* after modelling appropriate feeding value adjustments (discounts) on the predicted supplies of protein and energy and expected animal performance.

Furthermore, the effectiveness of the microbiology work is compromised by quality of the Debre Zeit facilities: the existing laboratory is rudimentary and difficult to keep clean. Also, this small staff is scientifically isolated, which further impairs ILRI's capacity to efficiently pursue some of the current objectives (e. g., the search for detoxifying microbes, their molecular sequencing, and whether they are likely to be maintained in the ecology of the rumen after inoculation). Because of these limitations, certain microbiology questions on the research agenda requiring substantial facilities and a larger core of researchers should be carried out externally.

The Panel also *urges* that continuing microbiology work in support of nutritional evaluation (e.g., inhibition by tannins) be relocated at the Nairobi campus, where the facilities better match experimental requirements.

To integrate a systematic global evaluation of forages, crop residues and other feeds with the nutritional evaluation of dietary options to increase animal productivity and net economic returns, the Panel recommends merging Projects 8, 9 and 10 (Feed utilisation improvement for improving livestock productivity; Rumen microbiology for feed utilisation enhancement; and Characterisation and conservation of forage genetic resources) into a cohesive Ruminant Nutrition Management Project.

Thus fused and reoriented, it would better complement the regional research efforts and the smallholder dairy project (Project 19), the Systemwide Livestock Programme, and the respective networks of NARS. It would also enable linkages with the research on molecular characterisation of rumen microbes that is recently underway at the Nairobi campus. The Panel's recommendation would enable ILRI to fully capitalise on its research capacity if collaborating scientists were located at a single location.

6.6 Interactions among Genetics, Health, Nutrition and Feed Supply

This section is to remind readers of the kinship between biological science and system science applications to agriculture. Like the dynamic agricultural systems containing them, many factors affect the productivity of ruminants and their herds and flocks. Also, there are important, sometimes large, interactions among genetic, health, and nutritional factors in the environmental milieu of agriculture across agroclimates and farms. Although there are several kinds of interactions, depending upon the resources and information available to farmers, those with dietary nutrient supply are fundamental because gene products require a balanced substrate of nutrients and a healthy environment to be fully expressed. Insufficient or unequal nutrient supplies signal unequal payoffs from other factors and the livestock system as a whole. As a result, it should be recognised that the effects from every technical factor of the life sciences are ultimately manifested as utilisation, stocks and flows of nutrients across all system scales (e.g., animal, herd or flock, farm, landscape).

Increased gene frequency for disease or parasite resistance (or, alternatively, the use of vaccines or chemotherapy) improves the environmental health backdrop of animal performance. However, the corresponding reductions in mortality and morbidity translate directly into greater total requirements for nutrients to support more, and healthier, surviving animals (i.e., greater collective "appetite" demands by more animals in larger holdings). Consequently, this favourable *intermediate outcome* exacerbates nutritional limitations. Unless dietary supplies are improved to match the increased collective nutrient demand, there may not be any *net* increase in productivity, or economic benefit, if the *gains* portended by reduced disease are cancelled by equal, or maybe greater, *losses* among less well-fed and more immunologically compromised animals. Hence, synergies among constituents of the biological system are essential to productivity and net economic gains in farm households, here illustrated by an unfavourable interaction between health status and nutrition status. Although loss reduction is necessary to improve the performance of animals and livestock systems constrained by disease, it is insufficient for achieving the desired final outcomes. Because factor interactions have important effects on the performance of animals and herds (flocks), they underscore the need for cross-location synthesis of outcomes and impacts, and the strategies for achieving them.

6.7 Assessment of the Direction and Quality of the Programme

Overall, ILRI's work in the Biosciences has many elements of good quality, although it requires greater focus in order to achieve a substantive output of high quality. Specific project areas are weak and have been identified in the preceding sections together with suggestions and recommendations for their improvement. The direction of the projects on animal genetic resources and the development of disease resistant livestock (sections 6.1 and 6.2) are very appropriate and although the projects are highly focussed and productive, the Panel considers that co-ordinators' posts should be filled without delay. The group of projects considered under disease control and diagnostics (section 6.3) contain some of the core skills in molecular biology and immunology that underpin the development of new technologies; these are essential for ILRI so that it can capitalise on the new opportunities presented by Biotechnology and Genomics. The current directions are broadly appropriate but require further focus so as to reduce the large number of aims and objectives. An important area is the development of vaccines, and the strategies, approaches and feasibility need to be critically evaluated, as well as fully evaluating the current ECF vaccine candidate in field trials. The area of epidemiology (section 6.4) has appropriate goals and is undertaking well focussed and relevant research; however, care must be taken to avoid that external funding driving the work into too many diverse areas. Adjustments are needed in the ruminant feed resources area (section 6.5) in order to increase the probability that this work leads to a reduction in the constraints on ruminant productivity, and the effectiveness of the microbiology work needs to be assessed. While the overall direction is an area of high priority, the research needs to be re-focussed around clear-cut achievable aims with high impact. In conclusion the Panel believes that it is important to do fewer things very well rather than do a wide range of things poorly.

The evaluation system (Chapter 11) was used here to obtain an approximation of overall scientific quality for each research project. Two factors were used to explain variations in the quality and quantity of outputs; these were research focus (relevance and feasibility of high priority objectives) and critical mass of available human and other resources for maintaining or improving research quality. To report the results of this analysis it is simplest to consider the Biosciences Programme's projects in three groups: projects 1 and 2; projects 3-7; and projects 8-10. In the first group the quality scores exceeded the Panel's threshold definition of good science defined in section 11.2, and the focus was excellent, although critical mass was identified as a problem in terms of maintaining this output and improving quality. The second group equalled or exceeded the ranking of good science, but overall were below average on focus while having sufficient critical mass. The third group fell below the quality rating of good science and showed average or well below average levels of focus with one project (9) being considered to have a low critical mass. Clearly these problems need to be addressed to improve output and quality.

As shown in Chapter 5, the Panel **suggests** structural alterations of the research programme. On the basis of the rationale provided in Chapter 5, projects 1 and 2 would form the Animal Genetics and Genomics Programme, projects 3-7 would form the Disease Control Programme and projects 8-10 would join the new Production Systems and Animal Nutrition Programme.

CHAPTER 7 - SUSTAINABLE PRODUCTION SYSTEMS PROGRAMME

This programme builds on the portfolio of factor interactions considered in the Biosciences Programme, and further develops it to facilitate favourable impacts on farms, families and communities, and the landscape. Through information and research collaboration it also facilitates the programmes of NARS and government and non-governmental organizations. Foci include improving productivity and economic opportunities for families managing crop-livestock systems, especially smallholders, improving food security, and reducing natural resource degradation. Common biophysical themes include better utilisation of animal, feed and health resources, animal nutrition management, and nutrient cycling, transfers and management on the crop-livestock nexus. Key bioeconomic themes include increasing net economic returns with adaptable technologies that alleviate constraints, improving market opportunity, quantifying benefits from systematic use of available resources, and identifying policy options for households and communities and for national, regional and international audiences.

The programme is complex; its 9 primary projects currently comprise 40 operational ones (hereafter called sub-projects), of which 5 are nearly complete. The large number of sub-projects reflects restricted-fund investments in recognition of the value of livestock in agricultural development. Refer to Appendix I for details about these projects.

Given this complexity, this chapter examines crop-livestock production and systems analysis research, including *ex ante* analysis. Chapter 8 jointly examines *ex post* impact assessment and livestock policy research. The first section of this chapter begins by assessing two headquarters-based projects that are directly linked with several components of the Biosciences Programme. These projects address issues of livestock productivity under disease risk and smallholder dairy systems (Project 18, comprising 3 sub-projects and Project 19, comprising 8 sub-projects). Regional projects (Projects 13, 14, 15, 16 and 17) are assessed briefly in the next section with emphasis on complementarity and the value they add to the Institute's core work on crop-livestock systems, especially in light of productivity in priority areas and the existing tight financial situation. These five ecoregional efforts contain many common themes among their 14 sub-projects. The final section is devoted to systems analysis and *ex ante* assessment (Project 11, comprising 7 sub-projects).

7.1 Livestock Productivity under Disease Risk (Project 18)

7.1.1 Current Strategy

This multi-component effort focuses on increasing productivity and net economic returns in the large region of under-exploited grasslands of the sub-humid zone of sub-Saharan Africa, especially through greater use of trypanotolerant ruminants, improved vector control, and less drug use. In addition to integrated activities and partnerships in several countries, long-standing international partners with common goals are also involved.

Research foci include determining constraints and opportunities for effective, and more widespread use of trypanotolerant livestock, enhancing disease resistance, assessing alternative control strategies in tsetse infested areas, and identifying preferred control measures using decision support tools. Besides partnerships in several countries, research linkages within ILRI are with projects in ruminant genetics and health (especially Projects 1, 2 and 7 in the Biosciences Programme) and dairy systems, ecoregional projects, systems (and impact) and policy analyses (especially Projects 11, 12, 13, 14, and 19).

7.1.2 Achievements

Project 18 works closely with the International Trypanotolerance Centre (ITC) in The Gambia, and is part of the successful African Trypanotolerant Livestock Network (ATLN). A major achievement by ATLN members and its farmer collaborators was to measure and document productivity of trypanotolerant N'Dama cattle under varying amounts of tsetse (disease) challenge. Contrary to general expectations, results showed that

- 1) productivity of N'Dama cattle was comparable to other breeds in low-input production systems elsewhere in sub-Saharan Africa,
- 2) productivity varies with trypanosomosis challenge, and
- 3) poor nutrition is a key limitation where tsetse challenge is low.

These salient findings, published jointly by ILRI and ITC, documented that this breed is valuable, not only for its inherent ability to survive under the threat of disease, but also for its comparable productive ability and responsiveness to increased inputs of feed (Agyemang et al. 1997. *Village N'Dama Cattle Production in West Africa: Six years of Research in The Gambia*. 131 pp).

This project adds evidence of opportunities to increase farm productivity by managing disease-tolerant animals. Large differential responses in N'Dama cattle to the two major trypanosomes implied potential genetic control of them. Mean packed red blood cell volume and parasitaemia were verified as useful measurements in predicting cattle performance; they were also found to have a genetic basis, which portends increased trypanotolerance by selection.

Variation in trypanotolerance was quantified using validated antigen detection techniques. Methodologies were developed and tested for predicting spatially geo-referenced variations in trypanosomosis risk using tsetse information. Relationships were determined between vector reduction, degree of trypanosomosis infection, and productivity in cattle and goats.

Widespread resistance to trypanocidal drugs was quantified. Study showed that decisions based on information about trypanosomosis risk can reduce drug expenditure, drug resistance and mortality, thus improving net income to farmers. A reduced risk of human trypanosomosis and broader distribution of benefits from livestock production are expected spin-offs. Work at benchmark sites found economic benefit in disease control, and revealed incentives for collective action and policy making. As a result, regional control strategies have been designed in East and West Africa, and they have ramifications in national policy-making.

7.1.3 Future Plans

- Evaluate methodologies and develop strategies to evaluate trypanotolerance and performance traits, including effects of infection on post-partum anoestrus, conception, embryo mortality and abortion in N'Dama cattle.
- Estimate genetic parameters for trypanotolerance measurements. Quantify associations between indicators of trypanotolerance in juvenile animals and their subsequent performance.
- Evaluate animals for resistance to dermatophilosis, ticks and internal parasites the better to match genetic resources to constraints in low-input systems, and to evaluate breeding opportunities.
- Evaluate interaction effects of trypanosomosis resistance, tick infestation, helminth infection, and other health problems on productivity. Study fly-host interactions and resistance in sheep in high-risk environments.
- Evaluate constraints and economic returns from alternative control techniques and strategies (e.g., animal nutrition and management, drug use, vector control, chemotherapy, acaricide treatment) for targeted production systems. Estimate the spatial and farming system distribution of benefits and costs of tsetse control. Design and test approaches to improve productivity under high-risk conditions.
- Evaluate factors affecting livestock prices in selected countries, including market infrastructure. Collect data for estimating the effects of economic policy reforms on low-input and market-oriented systems in tsetse-affected areas of West Africa.

7.1.4 Assessment

Project 18 is a highly productive, focused, and well-integrated effort, with excellent multi-disciplinary and multi-institutional partnerships, that help to ensure significant gain at multiple scales. The Panel commends collaborations with numerous projects in both of ILRI's research programmes and encourages the continued maturation of such collaboration, especially with Projects 1, 2, 7, 14 and 19. The Panel also commends the recognition of important biological and economic interactions among component technologies and variable management environments. Focusing on these factors portends substantial increases in livestock productivity in the sub-humid zone. If plans are not already underway, quantitative genetics analysis of existing data *should be explored* with an able collaborator. It is further suggested that project collaborators plan to summarise additional data on N'Dama from other countries, and maybe other trypanotolerant cattle, for another publication that would add to and complement the one published with ITC. Information about disease (and parasite) tolerant livestock is needed by all layers of decision-makers in disease risk regions, from policy makers to farmers.

The co-ordinators of this project and Project 1 (Characterisation, conservation and use of animal genetic resources) were asked why N'Dama cattle are not more widely used throughout countries in the sub-humid region. Reasons given were that many farmers and other decision-makers lacked information about this "exotic" breed, and that farmers in the region encounter infrastructural bottlenecks and high transaction costs in marketing their

livestock. Thus, lack of information and limited access to market opportunities appear to be important constraints to productivity and farmer income in the sub-humid region as well as in East Africa (see section 7.2.4 for parallel findings).

The Panel *strongly supports* continuation of this project with the above encouragement and suggestions.

7.2 Smallholder Dairy Systems (Project 19)

7.2.1 Current Strategy

The demand for dairy products exceeds domestic supply throughout the tropics, thus making milk production an important *cash crop* for farm families. Using a production-to-consumption, food system approach, this research is aimed at developing and testing technologies (e.g., nutrition, disease control), tools, and methods with broad applicability to improve economic opportunities for farmers. The focus involves better understanding the evolution of dairy systems, identifying their constraints and the opportunities for improving smallholder systems, and developing policies that foster efficient resource use through improved input and output markets. Close collaborations involve a linked array of national and international institutions and NGOs.

7.2.2 Achievements

Several inter-connected avenues of research were explored to obtain recommendations and methods for improving the productivity of smallholder dairy systems. This endeavour was duly recognised with the *CGIAR Chairman's Prize for Outstanding Scientific Partnership*, which was jointly awarded to ILRI and KARI in 1997. Some of the project successes are summarised below.

The biological factors inhibiting farmer adoption, the interdependence of subsystems, the importance of policy and institutional constraints, and potentials for technical improvements in productivity were documented. Systematic analysis revealed the need also to address biological constraints and input supply issues through market (demand) and policy information, which helped foster a consensus on national priorities for research and development.

Feeding and cropping options that integrate forages, crops, manure, and nutrient transfers between crops and livestock were developed and tested in lowland and highland ecozones. Improving year-round supplies of feed provided farmers with greater technological options; benefits in productivity and net income came from integrating nutrient management with food and forage crops. Results stimulated formation of a consortium of institutions focusing on better ways to manage nutrient transfers to intensify crop-dairy farms. Based on epidemiological studies, targeted delivery of animal health management practices stimulated similar initiatives in the East African lowlands.

A holistic, methodological framework was developed to evaluate production, marketing and consumption subsystems, especially in East and West Africa. Rapid appraisals in four countries revealed many issues in common, including predominant informal markets and the sensitivity of farm income to market opportunities.

7.2.3 Future plans

- Test nutrition, disease control and marketing options and identify policy options. Evaluate the *ex ante* impacts of technological options for regions geo-referenced by disease prevalence and feed resource availability.
- Establish the effects of alternative diets on the nutrient composition of excreta, and quantify the consequences of its storage and composting. Evaluate the use of excreta as the sole fertiliser or in association with inorganic fertiliser.
- Determine the complementarity between crop-livestock activities and their effects on farmer decision-making.
- Further identify policy, institutional and technical constraints on farm productivity (e.g., feed, health, nutrient transfers via excreta).
- Carry out multi-location testing of dairy systems in inland valleys of three West African countries.
- Conduct longitudinal surveys of farm groups in Kenya with emphasis on feed resources, nutrient cycling, labour, and markets. Evaluate public health hazards in the marketing of milk.
- Develop transregional, geo-referenced databases of factors affecting dairy system development, including market linkages.
- Identify regions where demand for dairy products is likely to stimulate the adoption or intensification of dairy production, and where market opportunities are likely to emerge.
- Extend to Latin America and Asia methods and results from transregional analysis of smallholder dairy systems in sub-Saharan Africa.

7.2.4 Assessment

Smallholder Dairy Systems is an outstanding multi-disciplinary and multi-institutional project focusing on key biological and economic components and their interactions. It has been effective in increasing the productivity and net incomes for farmers, and in facilitating research and outreach programmes in participating countries, especially Kenya. Central bioeconomic mechanisms that are under study include better managed feed supplies for sustained nutrition, improving efficiencies of nutrient transfer and cycling between livestock and crops, disease control, economic assessment of technology options and market opportunities, and policy issues concerning resource use efficiency and relationships with input and output markets.

The complexity of interdependencies along the production-to-consumption continuum came to the fore through project findings. Substantial, even prohibitive, rural infrastructure bottlenecks were revealed in the form of transaction costs for smallholder dairy producers in East Africa (Staal et al. 1997. *Smallholder dairying under transactions costs in East Africa. World Development*). These costs increased with distance more than those for transportation

because of the high cost of information risk of spoilage before sales could be made. Consequently, producers were “willing to accept lower prices in exchange for a reliable (milk sale) outlet.”

The Panel was impressed with this project’s productivity and impact through systematic research efforts that focus on key factor interactions. Plans and activities for transregional, or cross-location, synthesis of findings and the diffusion of more widely applicable methodologies and information are sensible ways to contribute meaningfully to a worldwide agenda. Such a plan concentrates available resources on the priority productive outcomes. Research supplying technical change options, which are readily translated into economic growth (and incentives) for producers, signify multiplier benefits in commodity and input markets. Thus, connecting producers to consumer purchasing power is essential for development, as emphasised in Chapter 1.

The Panel *strongly supports* continuation of Project 19, and suggests that linkages be expanded with Project 18 to apply and test methods under conditions where disease risk is manageable.

7.3 Crop-Livestock Research in sub-Saharan Africa, Asia, Latin America, and West Asia, North Africa and the Central Asian Republics

[Improving productivity and sustainability of crop-livestock systems:

- ... in the highlands of sub-Saharan Africa (SSA, Project 13);
- ... in sub-humid SSA (Project 14);
- ... in semiarid zones of SSA (Project 15)]
- ... in fragile environments in Latin America and the Caribbean (Project 16);
- ... in West Asia, North Africa and Central Asian Republics (WANA & CAR; Project 17)]

The Medium-Term Plan for 1998-2000 identifies a “holistic production-to-market” focus for ILRI’s research agenda, which includes developing and testing outputs with partners at selected locations. The regional dimension of ILRI’s crop-livestock systems research involves work in “agroecological zones to facilitate transregional analysis and to broaden the recommendation domains for the application of the research outputs” (page 15). The Panel found this to be a useful guideline for assessing the regional dimension of ILRI’s portfolio of crop-livestock research in light of the current scarce-resource environment.

Against this backdrop, the headquarters-based Projects 18 and 19 should be viewed as primary contributors to ILRI’s regional and global agendas and objectives in highland and lowland agroecozones. The multi-disciplinary research in each of these projects involves effective linkages with many institutions and collaborators, transregional analyses are underway or planned, and foci include the market-oriented priority that was identified in Chapter 1 (especially in Project 19). Given these priority attributes and achievements by these research teams, the Panel views these projects as the central core of ILRI’s global or ecoregional work, which constitutes a strong foundation on which to evaluate how additional resources may best be invested.

Therefore, 14 sub-projects in five regional research projects were scrutinised for their contributions to core research in crop-livestock systems. The Panel considered that the priority projects to retain should be the ones that add significantly to the multi-disciplinary,

transregional work that is already underway. It is essential that ILRI's financial and human resources be invested in important thematic research areas (or platforms) that are broadly relevant, and that critical mass of scientists be established, serving multiple geographic locations. An analogy from art and science illustrates the Panel's approach in evaluating the regional projects—just as the sculptor creates by discarding unwanted pieces (the sculpture), so too does the livestock breeder, or geneticist, achieve improvement goals.

7.3.1 Current Strategy

These five regional projects are aimed at improving productivity and sustainability of crop-livestock systems in highland, sub-humid and semi-arid regions, where ruminants are an integral part of farming systems. As in Project 18, common project components involve biophysical and socio-politico-economic factors: animal nutrition and productivity, feed supply, nutrient transfer and cycling between crops, livestock and the landscape, net economic returns, farmer decision making, and policy influences on farm families, resource use and the environment.

7.3.2 Achievements

Understandably, claims of achievement are unequal because projects vary greatly in their tenure, productivity and financial support. Project 14 (which collaborates with Project 19) and Project 15 have characterised their respective production systems, determining parameters, nutrient flows between crops, animals and the landscape, and opportunities for productivity gains. The scientist team for Project 15 has distinguished itself with published research on the utilisation, cycling and transfers of nutrients among ruminants, crops and a semi-arid rangeland. This team also was a primary contributor and leader in producing ILRI's two-volume *Livestock and Sustainable Nutrient Cycling in Mixed Farming Systems of sub-Saharan Africa* (1995), which is an invaluable compendium publication in research planning.

Inter-cropping a forage legume with cereals in a highland system (with milking cows) was predicted to improve resilience of the farming enterprise with greater profits than systems without legumes, even with severe fluctuation in output prices (Project 13). This finding was consistent with other research in the East African highlands (Project 19). Previous achievements in developing technology for better managing vertisols, especially development of the animal drawn broad-bed maker, significantly increased grain yields on waterlogged highland soils. Building on this ILCA success, other attachments developed for use with the minimum tillage broad-bed maker further increased grain and straw yields of wheat by 30-35% while reducing animal traction requirements.

Project 16 focuses on the management of feed resources and nutrition, especially to improve milk income in highland and lowland Latin America. Research activities planned for 1999 include data collection, evaluation of feed resources, development of bio-mathematical models, and development of research proposals and concept notes for adaptive systems research.

Project 17 is aimed at crop-livestock interactions involving small ruminants and related issues in desert, rangeland, cropping areas and highland ecoregions of WANA and CAR. Activities planned for 1999 include a consultation in the Central Asian Republics and the selection of benchmark sites.

7.3.3 Assessment

Important learning and impacts have come from the vertisol and watershed management works in Project 13. The Government of Ethiopia has decided to integrate vertisol management technology into its agricultural extension programme, and NGOs like Global 2000 are incorporating them into their outreach programmes. Also, ILRI is currently completing an *ex post* impact assessment of broadbed maker technology. Crop-livestock research in this project overlaps with other ILRI work in the highland ecozone. Resources currently used for continuing study of cows for traction services probably would be more effectively invested in research of higher priority. Therefore, given these successes, it would be timely and prudent to strategically redirect these resources.

Traction has an important role in farming systems. However, research on using cows for traction in feed-limited environments of the Ethiopian highlands (Project 13) is unlikely to be successful because unfavourable trade-offs in milk yield and reproduction are unacceptably risky, particularly in low-income households. By increasing the maintenance requirement of animals, traction reduces the nutrients available for milk synthesis and reproduction, which is especially important when nutrients are limiting. Crossing native breeds with larger exotic breeds also increases the maintenance requirement through larger body size in the crossbred. Providing a consistently secure and significant increase in dietary nutrient intake is required to obtain the same performance in milk and reproduction when crossbred cows are worked. This is a risky proposition for farmers concerned about providing enough feed to their cows. Besides the issue of farmer objectives for increasing income from milk sales and trade-offs in milk yield or reproduction, they are asked to implement a chain of innovations carrying compound risk factors. Substituting improved forages for current grasses and fodder and maintaining the supply of higher quality forage carries risk. Management to assure consistently improved diets to support harvesting more milk from larger crossbred cows further heightens risk. (An associated question is whether farmers are successful in maintaining body weight, milk yield and reproductive rate from recently introduced crossbred cows and forages.) Finally, how willing are farmers to accept the trade-off of forgoing milk income for service in traction? Evidence from many developing countries supports an inherent farmer preference for cash income compared to benefits that are less convertible in meeting short term needs.

Projects 14 and 15 have been productive and effective at determining *best-bet* forages, feeding strategies, and at quantifying the stocks, flows and balance of nutrients between livestock and crop components of farming systems and the landscape at their respective field sites. This expertise could be effectively combined to build critical mass for greater achievement in these important research themes. Given ICRAF's collaboration with ICRISAT in Mali, and ILRI's mutual interest in utilising trees for forage, it is prudent for ILRI to establish closer ties with ICRAF, possibly at their Mali site, and to focus on market-oriented opportunities in the sub-humid ecozone.

The Panel considers that two half-time staff with small operating budgets at separate locations in Latin America constitutes an inefficient use of resources (Project 16). Meaningful research output is unlikely unless the efforts of a full-time staff member can be combined with a primary ILRI effort. Dairy or dual-purpose systems in Latin America constitute a logical interface with Project 19, and a viable basis for collaboration with ICRAF and CIAT.

Project 17 is barely underway in WANA and CAR. The Panel encourages collaboration with ICARDA to acquire the additional necessary resources for a productive and successful project. Efforts by the recently hired Senior Small Ruminant Scientist at ICARDA are heading in this direction.

The Institute needs to rethink its focal research themes for crop-livestock systems. Such an exercise is likely to result in a modified strategic plan of work probably centring on the primary bioeconomic mechanisms governing economic and environmental successes in crop-livestock systems, which would supply key information to subsequent systems science, impact, and policy research. These priority themes, or “platforms of essential capacity”, will probably involve:

- Nutrient dynamics in crop-livestock systems, especially the efficiency of transfers and the cycling of nutrients involving ruminants;
- Bioeconomic relationships on the nexus between these nutrient transfers, natural resources, and their joint management;
- Animal nutrition and management;
- Technology options and associated market opportunities, especially those influencing cash income to farm households; and
- Policy issues that constrain input and output markets and resource-use decision making by farmers.

A thematic research approach is required, not a commodity one. Although the title of Project 19 implies a commodity emphasis, it is much, much more than milk. It is strategic work that is aimed at better delivering income growth to farm families, regardless of the livestock species or configuration of the crop-livestock system; it aggressively searches out better market opportunities and technologies that should be developed especially for that context. Furthermore, the transregional activities already underway in this project make it a logical vehicle from which to establish a global consortium for market-oriented crop-livestock systems with collaborating NARS and IARCs in East and West Africa, Asia and Latin America.

To stimulate income growth and food security for farm families, to help alleviate poverty, and to conserve natural resources, the Panel recommends that ILRI strategically orient the production systems research programme, and establish an ecoregional or global consortium for market-oriented crop-livestock systems. To accomplish this:

- i) **Project 19 (Market-oriented smallholder dairy systems) should be broadened to constitute a transregional or global research project that is especially aimed at enhancing economic growth of rural households by developing more profitable and sustainable market-oriented crop-livestock systems.**
- ii) **Scientific staff in Project 13 (Crop-livestock systems in the highlands of SSA and Asia) should be reassigned, possibly to Project 19, to increase the**

critical mass of scientists focusing on transregional research objectives and market-oriented systems.

- iii) **The expertise of Project 14 (Crop-livestock systems in sub-humid SSA and Asia) and Project 15 (Crop-livestock systems in semi-arid zones of SSA and Asia) could be consolidated to form one project having more critical mass to focus on market-oriented systems in the sub-humid zone, co-ordinated with Project 19, although not restricted to dairy.**
- iv) **If Project 16 (Crop-livestock systems in fragile environments in LAC) is to be continued, it should become part of the transregional smallholder livestock system's efforts of the re-designed project 19 with a full-time ILRI staff member.**

The Panel also *urges* establishing a close working relationship with ICRAF, and also with CIAT in forage development in Southeast Asia.

Collaboration is *strongly encouraged* with ICRAF, CIAT and CIP.

Regarding ILRI's ecoregional-cum-global research, and its SLP convenor role, the Panel **suggests** close consultation with ICRAF to seriously evaluate collaborative opportunities at ICRAF's benchmark sites (e.g., African Highlands Initiative, Alternatives to Slash and Burn Programme). This could be an excellent opportunity to join forces on issues of nutrient cycling and feed-use of trees and shrubs, which have been research themes of Project 19.

7.4 Systems Analysis and Impact Assessment (Project 11)

7.4.1 Current Strategy

Several factors govern the relevance and output from research programmes, and the value of technologies disseminated from them, to improve livestock productivity and profitability. Research questions must be focused, the constraints to adapting or adopting technologies must be accurately specified, and technology delivery mechanisms must be suitable and in sufficient supply. Project 11 accounts for these constraints and seeks to estimate the effects of implementable technologies, to identify meritorious research issues, and to accurately quantify the contributions of livestock to agroecosystems. Selected *ex ante* impact assessments are aimed at identifying researchable issues that, if resolved, can enhance agricultural productivity, reduce poverty, and maintain natural resources (an ILRI example is shown in section 7.4.4). These assessments are viewed as enhancements to technology delivery, especially of animal health, feed resource and natural resource management options, leading to the subsequent quantification of socio-economic and environmental impacts.

7.4.2 Achievements

Appropriate methodologies have been adapted and applied (e.g., section 7.4.4). Substantial effort has been invested in building needed databases since the beginning of Project 11 in July 1997. Geo-referenced databases of natural resource endowments at multiple scales across sub-Saharan Africa have been developed, which has facilitated

development of new tools and methods to address the interactions between agricultural systems, natural resources and human welfare.

Ex ante prediction studies showed similar favourable net economic returns (~30%) on a 30-yr horizon from research

- 1) to develop vaccines against trypanosomosis (see section 7.4.4) and theileriosis and
- 2) to genetically improve the nutritive quality of sorghum and millet residues to feed ruminants.

Prediction studies based on the interactions among human population growth, changes in land use, and trypanosomosis suggest important shifts in the epidemiological nature and location of this disease in the next 45 yr. Environmental and socio-economic effects of trypanosomosis control in East and West African countries suggested important impacts on human welfare, crop and livestock production, and the use of land and other natural resources.

7.4.3 Future Plans

- Develop a generalisable, nutrient cycling model and framework for the bioeconomic and environmental evaluation of crop-livestock systems using data from semi-arid West Africa (with Project 15).
- Develop an easy-to-use computer model for estimating the cost of tick-borne disease in cattle (anaplasmosis, babesiosis, heartwater, theileriosis) in Africa and Asia.
- Develop a standardised, geo-referenced livestock and natural resource management database for different scales of inference. Integrate animal health, feed resources and natural resource management information, and decision support tools to facilitate the delivery of technologies.
- Develop and apply appropriate crop-livestock, ecosystem and land-use models to decision making and monitoring frameworks.

7.4.4 Assessment

The complexity of agricultural systems—multiple factors of production having spatial, temporal, social and economic dimensions—requires careful analysis to disentangle and quantify the key mechanisms and outcomes, including human and environmental welfare. Systematic frameworks of analysis help sharpen the focus of technology development and delivery programmes. The corresponding methodology should add value by testing efficacy and by estimating overall worth and impacts from technical change products (i. e., better practices, technologies, and strategies).

This *livestock system science* project is designed and conducted in this way. An ILRI study by Kristjanson and co-workers [Measuring the costs of African animal trypanosomosis, the potential benefits of control and returns to research. *Agricultural Systems* (in press)] illustrates a methodological implementation that was used to predict overall worth of a technology under certain assumptions. Expected productivity changes in the cattle

subsystem, additional economic returns from cattle herds, and geographic information for continental Africa were combined to estimate the “big picture” of impact on a continental scale by achieving control of trypanosomosis with an efficacious vaccine (a product expected from Project 5). Although the estimated internal rate of return was favourable, what is especially valuable from this kind of tailored analysis is its wide application in evaluating nearly any technological change.

This kind of analysis also helps convene a forum for discussion about strategic investments in research, putting the research institution in the “driver’s seat”. Net returns like the ones predicted in the example above (33% internal rate of return and 34:1 ratio of benefit-to-cost) might be interpreted as evidence of *under-investment* in achieving the goal in the desired timeframe. Arguably, public goods result from investing sufficient resources to obtain research outcomes within a capped time period, where early achievement is preferable to deadline delivery (e.g., before chemotherapy invokes significant change in the genome of the pathogen). Therefore, private and public goods carry different objectives: instead of maximising net returns on the invested resources, acceptable goals for public goods may require only small positive net returns (e. g., $\leq 5\%$), or even negative ones (e.g., the resultant impact was less than prescribed). For these technical change scenarios, the first step by investment decision makers (research contractors like ILRI and potential investors) is to review the scientific basis of project feasibility and the benefits expected by achieving the proposed goal, comparing them to similar historical successes. Subsequent steps in reaching the investment decision are to calibrate the timeframe in which to deliver the good, to specify the minimum acceptable internal rate of return on the amount to be invested, and, finally, to calculate the concomitant investment that is merited. In this context, predicted net returns that are high may signify too little investment because of opportunity trade-offs by foregoing potential early delivery or by constraining the probability of achieving the prescribed goal.

The Panel *commends* the efforts in Project 11, and *strongly encourages* involvement on a continuing basis with other projects. This involvement obviously needs to begin at the research design stage to facilitate assessment of probable and realised impacts.

7.5 Assessment of the Direction and Quality of the Programme

Overall, ILRI’s work in productions systems contains many elements of good quality that provide the basis for rethinking its strategy to assure substantial favourable impacts on crop-livestock systems, the natural resource base and the environment. The direction of the projects on livestock productivity under disease risk (section 7.1) and smallholder dairy systems (section 7.2) is appropriate and highly focused. It is also valuable not only to NARS collaborators, but because interactions among crop-livestock, natural resources, environmental, and market access components are also priorities. The Institute has valuable opportunities to move forward by redirecting resources to intensify regional research in market-oriented crop-livestock systems, integrating this work with Project 19 to constitute a global consortium of collaborators, as discussed in section 7.3.3. Organised in this manner, systems analysis research would be empowered to evaluate better the most relevant bioeconomic and natural resource management options for animal agriculture in the developing world.

The matrix scoring method described in section 11.1 was used to obtain an approximation of overall scientific quality for each research project, and for the Sustainable

Production Systems Programme as a whole. Two explanatory factors helped sift out possible reasons for quality variations. These factors were research focus (comprising relevance and implementable objectives of high priority) and critical mass of available human and other resources for maintaining or improving research quality. (Other considerations were average quality and output of publications.)

Most quality scores equalled or exceeded the Panel's minimum threshold definition of "good science", which was given in section 11.1. Scores in research focus suggested that attention is warranted in Projects 13 and 16, independent of arguments that market-oriented farming systems should be an ILRI priority research theme. Scores in critical mass pointed to a need for more attention to investments in Projects 15, 16 and 19 to maintain quality.

As shown in Chapter 5, the Panel suggests structural readjustment of ILRI's research programme. Following these suggestions, Projects 11 and 12 would constitute the System Science, Impact and Policy Analysis Programme, and Projects 13 to 19, as well as Projects 8 to 10, would constitute the Production Systems and Animal Nutrition Programme.

CHAPTER 8 - RESEARCH ON IMPACT ASSESSMENT AND POLICY ANALYSIS

8.1 ILRI's Approach to Research on Assessment of Impact and Policy Analysis

This chapter deals with research regarding the assessment of impact of ILRI's projects and the policy research needed to extend the benefits of ILRI's output. It does not analyse the impact of ILRI in aggregate, an issue addressed in section 11.2.

Although Project 11 (Systems Analysis and Impact Assessment) was discussed in chapter 7, because of its relation with sustainable production systems, it is also reviewed here because of its potential relation with project 12 (Policy Analysis). Project 11 evaluates the impact of the other ILRI research projects. Its objectives are to provide estimates of impact (*ex-post* analysis) of the knowledge, processes, products and technologies developed by ILRI and the expected impact (*ex-ante* analysis) when adoption occurs. The project has an annual budget of US\$ 1.6 million, but will diminish to US\$ 1.3 million by year 2000.

Recognising the importance of an adequate policy framework to create the desirable conditions for technological innovation, ILRI has implemented a project on policy analysis (Project 12). Its objective is to identify and quantify the impact of livestock policy and institutional reform on livestock productivity and technology uptake. The project has an annual budget of US\$ 1.65 million, for three years. The analyses to date focused on policies to favour the extension of small holder dairy cattle production systems, better animal nutrition and animal disease prevention and control, and balancing livestock productivity and environmental sustainability.

Projects 11 and 12 are undertaken with limited interaction between them. Yet, as it will be discussed here, the need for alignment of their agendas and for complementary efforts prompted their analysis in this chapter.

8.2 A Methodological Consideration

For a proper assessment of impact of ILRI projects, it should be recognised that research conducted by ILRI generates outputs that have value themselves, before reaching farmers. The output can take multiple forms, including a vaccine, a genetic resource, a process, the design of equipment, technologies, and knowledge of prevailing conditions generated by a diagnostic. Products of research, which also have value are publications, including training manuals, journal articles and books which increase awareness and knowledge. Therefore, the output of livestock research has to be assessed in the context of its potential impact, and there is need to understand and monitor the additional steps until impact is achieved at the level of ultimate users.

When there is an uptake of research output, the process generates outcomes. These take forms including: commercial production of seeds and equipment, changes in technologies, farm level investments, production of breeding cattle and changes in farming systems. Outcomes are therefore intermediate stages in the way to achieve impact. Even when pursued by the research organization, successful adoption often requires policies that

encourage the transformation of research products into assets for development through improved income and quality of the environment.

The output of research and its eventual impact occur in many ways. For example, when a vaccine is transformed into a commercial product, and is used by producers in their cattle, the mortality rate diminishes and productivity increases, hence it has positive impact on income. When germplasm becomes a commercial seed used by producers, it may result in increased yields, less use of fertilisers and water and better profits. Impact can also result when a design is patented and thousands of units are produced, purchased by farmers, and used, saves power and relieves the farmer from physical effort, increases efficiency, lowers cost and increases net income. Impact also takes place when, aware of the results of a diagnostic, governments launch a programme to control a disease, which reduces cattle mortality, improves their strength and working capacity and prevents the decline in the stock of animals, a most important asset for farmers.

In all these examples there is need for policies and investments that reduce transaction costs, and increase the prospects for positive impact. The extent of outreach to large numbers of beneficiaries and the amount of positive change depend on the effectiveness of policies. Such policies, therefore, are aimed at creating conditions for research outputs to become outcomes that have impact and contribute to development. Understood in this way, the process can lead to a better approach to assess impact and analyse the effect of policies.

8.3 Achievements in Impact Assessment and Policy Analysis Research

Projects 11 and 12 have generated output intended to assist ILRI in revealing the returns to investment in livestock research, and potential gains to be derived by adequate policies. The outputs of this research, although interesting, deserve further discussion in light of basic assumptions on which the studies were based.

Valuable contributions were made by Project 11 regarding methodologies for impact assessment. Also the Project has addressed the problem of measuring environmental effects of technological innovations and contributed analyses of environmental improvement at farm level in the Highlands, the Sahel and southern Africa.

An ILRI study by Kristjanson and co-workers measured costs and returns to control of African animal trypanosomosis, and was also discussed in Chapter 7. The Study presented the potential economic benefits of a vaccine discovery, estimating a 33% internal rate of return and 34:1 benefit-to-cost ratio. These results should be taken with much care as they could mislead decisions on research priorities and allocation of resources. Assumptions about the time required to develop a vaccine may have been optimistic. Also, the analysis assumed no transaction costs between vaccine delivery and actual adoption by farmers. A systematic evaluation of all assumptions regarding the feasibility of output in all ILRI's research projects becomes a most justified task.

Early in 1996 ILRI performed an analysis of expected returns to its research in four major areas: feeds and nutrition, genetic resistance to disease, vaccines and dairy production technology. The *ex-ante* assessment was done using an economic surplus model on the basis of several assumptions regarding the number of years to output, probability of success of the research, rate of adoption by farmers and adoption lag. The analysis shows that the highest

rates of return are expected in developing disease resistance to helminths (42 percent) and developing vaccines (30-35 percent). Changes in the assumptions and accounting for transaction costs may have some effects in the results, yet such sensitivity analysis was not reported.

Recently, Project 11 published a Compendium of ILRI Research Impacts & Adoption for 53 projects, executed between 1975 and 1998. The data were provided by Project Co-ordinators, but were not in all cases the results of an impact analysis, but rather were assertions of Project Co-ordinators. Almost 50 percent of the reports refer to projects already completed, the remainder refer to on-going projects that had already generated some output. Also, 50 percent of the cases reported were *ex-post* analyses, the remainder were *ex-ante* studies. The summarised information reveals that ILRI work has generated valuable outputs. However, the outcomes and impact are not always presented, nor can they be determined solely from the available information. The potential is there to demonstrate that some of ILRI's work was worthwhile; but needs some conceptual and operational clarifications and some additional work to get homogeneous information for all cases.

Project 12 (Policy Analysis) provided valuable results of research on improving soil, water and nutrient management: option to increase market efficiency and competitiveness; and institutional reforms for efficient delivery of animal health services. For the several cases analysed, the Project has relied on field and market data, detailed specification of the current policy framework, and blending of technological and economic coefficients. Also it has used quantitative methods and models to capture behavioural relations and interactions. The latter include statistical and econometric models, simulation models and a Policy Analysis Matrix. Most valuable has been the partnership with national organizations responsible for policy and with IFPRI.

The analysis has shown the importance of adequate policies to remove institutional and market constraints. Such are the cases of economic and social benefits due to: i) increased number of N'Dama cattle, resistant to Trypanosomosis, which allows higher production of milk and meat as well as growth of the number and quality of animal stock, ii) provision of land titling as a necessary condition to undertake farm level investments, utilisation of manure to fertilise fields and adoption of technological innovations, and iii) organization of producers through co-operatives as a means to reduce marketing costs for milk produced in small households. These are a few examples of the relevant issues addressed.

The research in Project 12 is done in partnership with national and international organizations. The co-operation with IFPRI has proved to be most useful on a bilateral basis and within the Systemwide Property Rights Policy Research Programme convened by IFPRI.

Project 12 developed novel means for outreach, to let others know about the importance of adequate policies. In this regard, there are numerous papers published in refereed journals and internal ILRI publications. The *Policy Briefs* and the *Policy Dialog* are an effective means to reach key people, who do not usually have the time to read long reports, books and journal articles, yet they can provide a quicker response regarding policy decisions. The scientific and refereed publications have a different, desirable audience, but are usually not suited for policymakers. Other publications like the *Livestock Policy Analysis Manual* were also used for training.

8.4 Assessment of Quality of Research

An appraisal of ILRI's capacity for research on impact assessment and policy analysis reveals that it ranks well in the Institute's portfolio. These two projects together comprise a group of highly qualified professionals, with experience in Africa and employing sound methodologies. The quality of the research is reasonably high, nevertheless a refinement is needed to present results in a manner more usable for decision-making purposes, at ILRI and elsewhere.

The projects have focused on specific problems, which allows for in-depth analysis; however, they are challenged to cover a wider array of issues that deserve policy decisions to facilitate innovations in the livestock sector. Rigorous quantitative methodologies are an indicator of quality of research, yet their use is usually data- and time-demanding. Some sacrifice in quantitative analysis may be needed in order to address more issues rapidly. A multidisciplinary, highly participatory effort may provide an alternative to large data collection quantitative approaches.

These two projects are important in assisting ILRI to gain strength and recognition. They provide elements of judgement for the relevance and utility of research outputs. Their own output is a key resource to assist ILRI in developing a strategy for partnerships with influential organizations in the countries, and for the definition and implementation of development policies. They include the national authorities at the Ministries of Agriculture and Livestock, Economics, and Trade, as well as those responsible for managing national budgets. On the international side there are institutions such as IFPRI, FAO, the World Bank, and the regional development banks, with which there is already some ongoing co-operation.

8.5 Adjusting the Strategy for a Stronger Link between Impact Assessment and Policy Analysis

Projects 11 and 12 interact with other projects in the SPS Programme, yet more could be gained from some adjustments. First, such interactions should begin at the stage of design, to assure the identification of policies that reduce the constraints for the adoption of the project output. Second, stronger relations should also be developed with projects in the Biosciences Programme. Third, the staff in these projects, now operating in the Nairobi and Addis Ababa campuses should be placed together at one location.

The impact of ILRI work needs to be assessed not only on the basis of the contributions of research, but also on the other activities that the Institution performs. Scientific and technical aspects of research include the main activities (amounting to 77 percent of the programme budget); others include those under project 20 regarding strengthening of NARS, information management and networks (14 percent of the programme budget) and assessment of impact and Policy Analysis (9 percent of the programme budget). The assessment of impact should therefore examine contributions made by all activities, particularly if, as part of its global mandate, ILRI could become more involved in those other activities complementary to research.

ILRI should assure that its research outputs have value and provide clear signals of its potential impact on income of producers and the quality of natural resources. It is also

important to create increased awareness that the potential impact at farm level may be limited by existing constraints, which can be removed by policies and investments. ILRI should therefore consider the high return to improving the assessment of its work, revealing the potential impact of research outputs and contributing to sound livestock policies. In this way it can assist governments to create adequate conditions, institutional reforms and investments, including those that create greater research and extension capacity.

To enable the necessary integration of impact assessment and policy research, better orient the Institute's biophysical and production systems research (and its priorities), and provide a firm base for delivering outputs and generating impact, the Panel recommends that Projects 11 (Systems Analysis and Impact Assessment) and 12 (Policy Analysis) be merged, with all staff operating at ILRI's headquarters in Nairobi.

CHAPTER 9 - STRENGTHENING PARTNERSHIPS WITH NARS (SPAN)

9.1 Background

ILRI's activities in training, information systems and networking are grouped in the programme directorate SPAN (Strengthening partnerships with NARS). The objectives of this programme are to strengthen the research capacity of those components of national agricultural research systems that seek to improve the productivity of livestock and crop-livestock systems and to provide mechanisms and systems to allow ILRI to function as a knowledge broker for livestock research and development. The programme has four units (Training and Training Materials, Information Services, Publications group, and Collaborative Research Networks).

Many NARS in developing countries, especially in Africa, are fairly young and still struggling to develop the human resources required to carry out research in agriculture. This is particularly true in livestock research, which, in comparison with crop research, has generally not received major attention from national programmes. The sustainability of national agricultural research systems is, in addition, threatened by an increasing dependence on external donor funding for their operations. The African situation has been singled out by the recent CGIAR Systems Review as needing particular attention.

Considering the above circumstances, ILRI has resolved to maintain a high profile (relative to sister CGIAR Centres) to its training, information and networking operations.

9.2 Training and Training Materials

Current Strategy

The objective of the Training and Training Materials Unit is to develop regional and national capacities based on the needs of the NARS through technical and higher degree training of scientists. The Institute offers group training (for scientists and technicians) and individual training (student attachments, fellowships for students and scientists).

Primarily as a result of cuts in unrestricted funds, emphasis in the group training area has, over the past two years, been shifted from open training interventions to targeted programme and project-based training. To ensure relevance and effectiveness of training programmes, the research networks are used in sub-Saharan Africa to identify needs and priorities for group training activities. ILRI undertakes a post-training follow-up of trainees 6 and 12 months after training.

Development of training material resources is another major activity of the training unit. These materials are used for group training and self-study programmes by NARS. The training unit designs and develops the materials in close collaboration with the scientists, who are responsible for the technical content.

Achievements

From 1995 to 1998, a total of 269 scientists were trained in different technical areas of livestock research:

- 114 scientists through group training activities
- 85 through student attachments from training institutions
- 8 through attachments and fellowships of NARS scientists.
- 62 through graduate students and post-doctoral fellowships

From 1995 the ILRI postdoctoral programme ceased to be a training function, and is managed by the research programmes.

Group training activities covered the following topics:

Technical area	Number of participants	
	<u>Females</u>	<u>Males</u>
1. Animal genetics	3	9
2. Biometrics Application and in crop-livestock systems	19 (no information on gender)	
3. Data analysis and scientific writing/ presentation	-	15
4. Germplasm health and management	4	10
5. Agricultural information management	8	20
6. Ruminant nutrition and Feeding Systems	5	21

Most of the scientists in group training activities were from Africa and Asia. In contrast, graduate student attachments have benefited both developing and developed country nationals. Developed country nationals were mainly associated with collaborative projects funded by their countries. Two follow-up studies of ILRI training programmes were carried out in 1998; these were for the graduate fellows' programme and Small Ruminant Research Network training.

Three training manuals have been developed (Small Ruminant Production; Improvement of Livestock for Traction, Milk and Meat and; Nutrition of Ruminant Livestock). Supporting audio-visual materials have been produced on the diseases of small ruminants, the diagnosis of heat and pregnancy in cattle, and feed resources for ruminant livestock. Training materials on scientific writing were also developed. A project with the Swedish University of Agricultural Science to develop university-training resources on conservation and utilisation of animal genetic resources will start in 1999. These computer-based materials will be distributed to universities in developing countries, for training/teaching in conservation of animal genetic resources.

As a principal actor (and co-ordinator in 1998/99) in the IARC-NARS Training Group for sub-Saharan Africa, the Institute maintains the training database for all CGIAR centres active in SSA.

ILRI's Director General has, in late 1998, taken an active role within the Centre Directors Committee and with external partners, to build support and co-ordinate efforts in the preparation of the African Capacity Building Initiative (ACBI) suggested by the CGIAR System Review.

Assessment

As a legacy from its predecessor institutions, ILRI has a long-standing record of training, which has contributed significantly to human resources development in African NARS. Between the three institutions, a total of 3168 scientists have been trained. There is a high level of recognition among NARS of the Institute's training programmes. A majority of the NARS see training as one of the major contributions of ILRI in building the capacity of their organizations.

The decision of the Institute to focus on targeted training and to closely link its training efforts to the needs of its research partnership with NARS is a strategic one and should be maintained even if more resources should become available through the ACBI or any other programme.

9.3 Collaborative Research Networks

Current strategy

Networking was adopted by ILRI as a mechanism to increase collaboration with and among NARS research scientists, by creating a critical mass of scientists and establishing common priorities for livestock research. While ILRI uses networking as a principal strategy for strengthening NARS in SSA and has established three networks for this purpose, the emphasis for ASIA and LAC is to work through multi-partner projects involving NARS and other institutions and where necessary, use existing networks. The objective of each network is to strengthen research and development, training and information exchange for improved and sustainable animal production. Support for network activities is through special donor funded projects. Network activities include identification of regional research priorities, implementation of research activities, training and sharing of information through publication of research results and scientific meetings.

The role of ILRI in the networks is as follows:

- ILRI is the implementing agency for the networks
- ILRI and the network steering committee work together to secure project funds for the network operation
- Each network co-ordinator is jointly identified by the steering committee and ILRI, and then employed by ILRI, using network project funds
- ILRI works to build linkages between its own research agenda and portfolio of projects and those of the networks.

In general, ILRI's input in the networks focuses on mobilisation and management of resources, co-ordination of activities, providing technical backstopping and training. (please refer to Box 9.1).

Achievements

Currently there are three networks in SSA based on sub-regional associations; SADC, ASARECA and CORAF. The networks, established in the past 1½ years, but as yet not fully funded, replaced the former three disciplinary-based networks, which are currently being phased out. Formal agreements have been signed between ILRI and each of the networks.

- The networks have been able to strengthen linkages between livestock research scientists in SSA.
- The networks have so far been successful in mobilising financial support for agreed activities.
- Networks have generated scientific information that complements national research programmes.
- Participation of the networks in characterisation and evaluation of forage germplasm from the ILRI genebank, has led to the adoption of some of the forages by farmers in several countries.
- Work on characterisation of small ruminant genetic resources in East and Southern Africa is in progress as an agreed activity in the network. This work is expected to contribute significantly to information and knowledge on sheep and goats.
- Through the networks, ILRI has conducted several training activities on different aspects of livestock production related to network activities and training manuals have been developed.

Assessment

ILRI argues that the deficiency of technical and scientific skills continues to be a major factor influencing performance of the NARS, and that constraints in availability of resources for technical operations have limited the NARS ability to carry out research. The Institute has therefore resolved to put substantial effort in the resolution of these constraints. This is done through network related NRS staff training and through efforts to secure donor funding for network activities. Research grants amounting to US\$ 500,000 have supported network activities in participating countries during the period 1996-1998. The current structure of the networks, based on the regional NARS associations, is expected to offer enhanced possibilities to attract donor funding as they meet the current demands by donors for increased regional collaboration and ecoregional emphasis.

While the Panel commends the achievements of the networks in enhancing regional collaboration among NARS scientists and in providing necessary backstopping to these activities, it is concerned about the apparent loose linkage between ILRI's research portfolio and the one of the networks. The Panel urges ILRI to ensure that its involvement should only occur if the Institute's core research ties in with the research agreed in the network. The Panel is aware of ILRI's attempts to achieve this (e.g. by suggesting ILRI scientists as members of the network steering bodies; by appointing a task force, composed of ILRI scientists, to advise on ILRI's involvement in networks). The Panel believes that these are valuable instruments to achieve such closer links; it believes, however, that this objective would be much more easily achieved if the network co-ordinators reported to ILRI's Research Department.

Box 9.1 ILRI and the Networks

NARS – ILRI Collaborative Research Networks: a brief review.

Evolution of the networks.

The International Livestock Centre for Africa adopted networking as a mechanism to increase collaboration with and among NARS researchers in sub-Saharan Africa (SSA) to address constraints to improving sustainable productivity of livestock in mixed crop-livestock farming systems. Networking would avoid duplication of research, create a critical mass of national scientists, and establish shared regional agendas of research priorities.

Between 1989 and 1991 NARS and ILRI created three pan-African disciplinary networks: African Feed Resources Network, Cattle Research Network, and Small Ruminant Research Network. An external review considered the achievements of three networks in 1994. The review coincided with plans to establish ILRI and, more particularly, with initiatives from the Special Programme for African Agricultural research (SPAAR), NARS and donors to establish sub-regional organizations (SROs) for promoting agricultural research in SSA. The external review concluded that the networks had been successful in building capacity and collaborative research but less so for technology transfer. The panel also recommended that the network members respond to the emergence of the new SROs. There are now three multi-disciplinary networks, each aligned to one of the SROs: ASARECA, CORAF and SACCAR. The networks are associated with ILRI, but are owned by the NARS and SRO.

The objective of the ASARECA, CORAF and SACCAR Networks.

The overall objective of each network is to strengthen research and development, training and information exchange for improved and sustainable market-oriented animal production.

Governance of the networks.

Each network has a steering committee, comprising one representative from each country of the SRO, from ILRI, and the donor community. The network co-ordinator is an ex-officio member. The steering committee reports to the Committee of Directors (CD) of the SRO, which is the overall governing body of the SRO, responsible for approving regional priorities and programmes for research and technology development. Using the priorities agreed by the CD, the steering committee agrees network projects and activities.

The role of ILRI in the networks.

- ILRI is the implementing agency for each of the networks.
- ILRI and the steering committee work together to secure project funds for the complete network operation, including administration and management of network activities.
- Each network co-ordinator is jointly identified by the steering committee and ILRI, and then employed by ILRI, using network project funds. The work plan of each co-ordinator is set by the steering committee.
- ILRI works to build linkages between its own research agenda and portfolio of projects and those of the networks.

ILRI Networking within sub-Saharan Africa and in other regions.

The NARS in SSA include a wide spectrum of large and small institutions, with diverse skills and capacity. However, in comparison to other regions of the world NARS in SSA remain relatively weak. The recent CGIAR System Review has recognised this. Even for those NARS with strong capacity for crop research, the capacity for animal agriculture, and especially for crop-livestock systems research, is weak. There is no other animal agriculture networks operating in SSA. For these reasons, ILRI continues to give priority to the implementation of animal agriculture networks in SSA.

There are existing animal agriculture networks in other regions of the world, or networks that can easily include livestock. ILRI will not duplicate existing activities. ILRI's chosen method of operation in Asia and LAC is through multi-partner projects with NARS and other institutions. These projects include many of the general objectives of networking. Consequently ILRI sees no need at the present to establish new animal agriculture networks.

9.4 Information Services

ILRI inherited two libraries from ILCA and ILRAD. The libraries have continued to provide information services for NARS and other related organizations. In 1997, ILRI developed a strategy to reposition the Institute to meet its global information mandate. The strategy, which is forward-looking and pragmatic, was reviewed and endorsed by a CCER in 1997. ILRI is currently in the process of implementing the strategy and significant progress has been made with respect to the (electronic) integration of the Addis Ababa and Nairobi libraries, and with the production of CD-ROMs of ILRI literature.

Within the parameters of the strategy, the Institute plans to devolve some aspects of the dissemination of information to sub-regional centres and national organizations to both transfer the responsibility for these services for NARS scientists to NARS information systems and to free up ILRI resources for other information services. Work is also in progress with regard to the development of knowledge products using new information technology tools. Plans are under way, in partnership with FAO, to develop an Internet-based platform for worldwide information on research and development in animal agriculture.

Assessment

The information service provided by ILRI is much appreciated by the NARS and other users; ILRI is certainly the core world knowledge source on African animal agriculture research. The needs of the NARS for these services in developing countries will continue to grow as funding for library facilities in most of the national research organizations has dwindled to an almost non-existent state. ILRI's broadened mandate and constituency also adds to its responsibility in this area. The plans to reposition the information services to meet this demand are commendable. The financial requirements for implementing the technical aspects of the strategy are relatively moderate. The efficiency gains are thus expected to be large.

9.5 Publications Group

The Publications group based in the Addis Ababa campus performs a service function to the Institute by providing translations, editing, type setting and production services (both conventional and electronic). Translation services are available for English and French. The group is responsible for publishing Annual Reports, newsletters, technical publications and training materials. A database of ILRI publications, based on records of the unit, is maintained by the Information Services. ILRI publications are distributed to 865 and 253 libraries in developing and developed countries, respectively.

Assessment

The Publications group together with Information Service maintains linkages with NARS and other partners and also plays a major role in ILRI's outreach efforts.

ILRI maintains a printing press in the Addis Ababa campus. However, the volume of printing work generated internally is not sufficient to fully utilise the capacity of the press. The group has been very enterprising in selling its services to relevant institutions on a

cost-recovery basis. Such 'commercialisation' of ILRI's services in the open market needs to be addressed very carefully, given the legal status of the Institute as a non profit organization. With the proposed increase in the use of electronic services and technologies, internal requirements are likely to decrease further. The Panel believes that there are considerable opportunities for efficiency gains for the Institute in this area

9.6 Overall Assessment of SPAN

ILRI has maintained a high profile to its activities directed towards strengthening the technical and scientific capacity of NARS through training at various levels. This contribution is widely acknowledged in the African livestock research community, which so far has been the main target of these efforts. Similarly, ILRI's livestock information services are very much appreciated, and the Panel highly commends ILRI for these achievements.

While ILRI's new information strategy convincingly and strategically positions the Institute in the context of its global livestock research mandate, its policies with regard to the networks lack the same strategic rigour. The Panel **suggests** that ILRI programmes/projects together with regional priorities should provide the basis for collaborative activities with the networks.

The recommendation in Chapter 5, with regard to the integration of ILRI's Training and Information Services and of its networking and general institutional partnership development in the Research Department, is designed to drive these activities and services more explicitly by the research needs of the Institute.

The Panel believes that there is a very urgent need to emphasise, in the context of the global mandate of the institute, the design of appropriate policies for the building of research partnerships across the entire spectrum from governmental research organizations, to the private sector and non-governmental research institutions.

The Panel strongly *urges* the Institute to address apparent redundancies between its Publications group and the Public Awareness Activities in the office of External Relations.

CHAPTER 10 - EXTERNAL RELATIONS AND PARTNERSHIPS

10.1 Introduction

This chapter discusses ILRI's partnerships and other forms of relationships with external organizations. It does not focus on the Institute's External Relations Office (ERO), except in part. That Office's charge with respect to attracting core funds to ILRI and assisting with proposals for project funds is referred to in Chapter 2; its work in general public relations is discussed below.

ILRI's partnerships take a variety of forms. Most important are the Institute's relationships with its major host countries, Kenya and Ethiopia, where ILRI has its headquarters and principal office, respectively. In addition, the Institute collaborates with NARS both bilaterally and as part of networks, with other CGIAR Centres and related IARCs through bilateral arrangements and in inter-centre programmes, with FAO, and with ARIs, especially in cases where specialised skills are required that are not available at ILRI. In addition, there are numerous instances of scientist-to-scientist collaborations carried out in a more or less informal mode, and the Institute benefits from its work with visiting and seconded scientists. It relates to a variety of external publics, including donors and more broadly defined audiences.

The Institute inherited a number of partners from its parent institutions, ILRAD and ILCA. Currently, it counts over 200 institutions with which it collaborates officially. Within the last two years, over 60 of these have been formalised through Memoranda of Understanding or Agreement (MOU/MOA), instruments that spell out the modalities of the co-operation, indicating the responsibilities of each of the partners in the execution of joint projects and how the outputs will be shared. These agreements are then supplemented as individual projects are developed with documents detailing who will be involved, the resources required, and outputs expected.

ILRI recognises the value of strong partnerships as they provide an opportunity to share resources and information and to benefit from new skills and perspectives, especially in the case of NARS that offer the perspectives of the end users. It is clear that the whole can often be greater than the sum of its parts. The benefits are also recognised by donors who encourage regional collaboration and the ecoregional emphasis this makes possible.

The Panel sought to understand the nature and value of ILRI's partnerships first by means of a survey sent to 84 selected institutions; second, by visits to a number of partners in the host countries and in Niger, Nigeria, Peru, and Colombia. The comments below derive from both these sources.

10.2 ILRI's Relations with Kenya and Ethiopia

The relationship between ILRI and both Kenya and Ethiopia, appears to be very cordial; the Institute enjoys the co-operation of all levels of the respective governments.

In the case of Kenya, ILRI's principal collaborator is the Kenya Agricultural Research Institute (KARI). The relationship with KARI has been long standing, and there is strong support from the top. The Director General expressed his appreciation of past collaboration and the wish to promote an expansion of joint activity in the future. At the working level, collaboration with the partners in Kenya on special projects has been very good, especially in on-farm research that involves many players, including the Ministry of agriculture. Collaborative activities also include joint supervision of graduate students and jointly organised workshops. The Panel noted high mutual respect and appreciation of partners' contributions in projects. Some staff showed concern that they had been inadequately involved in the early stages of research planning or "sidelined" during later implementation of projects, while others were strongly supportive. The collaboration with the Kenya Trypanosomosis Research Institute (KETRI) is, as yet, not at the level desired by both institutions. However, there have recently been meetings to discuss substantially increased interaction. ILRI scientists also participate as resource persons in some teaching activities at the University of Nairobi, Faculty of Veterinary Medicine. The Institute provides laboratory and library facilities to the faculty and students.

In Ethiopia, ILRI's principal partner is the Ethiopian Agricultural Research Organization (EARO). As the Ethiopian Government has recently determined to give agriculture a higher profile, EARO's reporting status has been transferred to the Office of the Prime Minister. Again, the Director General is eager to expand collaboration with ILRI and to relegate to the past any problems that have existed. Again, these have focused on a one-way approach on the part of some ILRI staff. The Panel believes, however, that there is the will on both sides to reshape the relationship, collaborate in the earliest stages of research planning, and direct future research toward issues of greater strategic relevance.

Both Kenya and Ethiopia have benefited substantially from ILRI programmes particularly in the area of training where one third of all the people trained (including those trained by ILCA and ILRAD) were from the two countries.

In two other countries visited by the Panel, Niger and Nigeria, where ILRI has outposted staff, the Institute has established a very good relationship with the NARS and other CGIAR Centres (ICRISAT Sahelian Centre and IITA) working there. In both countries the NARS were positive about their collaboration, including development of joint projects, which they saw as an opportunity to attract funding.

10.3 Partnerships with the NARS

ILRI's relationship with NARS, bilaterally and in networks, is covered in all its aspects in Chapter 9. With respect to research collaboration in particular, the Institute's ultimate goal is to generate or facilitate generation of technologies that can improve animal agriculture, particularly smallholder production systems. Validation and adaptation of new technologies for specific production environments is an important component of the technology development process and requires the participation of NARS and end users. In addition, assessing the impact of technological interventions will require similar participation and access. The NARS thus provide ILRI with an essential grassroots linkage. This is especially true with production systems and animal genetic resource work. To illustrate, work on animal genetic resources requires breed surveys and performance characterisation of indigenous breeds, which can only be done through or by the NARS, while related activities

in molecular genetics is an area of ILRI's comparative advantage. By working closely together, there is a greater likelihood that relevant and useful technologies will be developed in a reasonable timeframe.

Formalising partnerships with national agricultural research organizations has contributed to a strengthening of the long-standing institutional linkages between ILRI and individual organizations. Most importantly, it has also set the stage for fully interactive partnership, where both parties have something to contribute and gain from collaboration. Prior to this development, both ILRI and the national institutions were often postured in an unequal relationship that could only be viewed as beneficial with respect to building the capacity of NARS; otherwise, it was a disincentive for research collaboration. Some NARS scientists felt that their inputs into collaborative research were not sufficiently recognised.

10.4 Collaboration with the CGIAR Centres and Other IARCS

Collaboration between ILRI, CGIAR centres, and other IARCS has also taken several forms, including joint research projects and training, joint appointments and staff exchange, outposting of ILRI scientists at Centre sites; and participation in ecoregional consortia and systemwide programmes. Where ILRI has a physical presence with any of the centres, it has established good working relations in research, training, and even some in some management areas, such as the sharing of salary surveys. In Kenya, ICRAF recognises the location of the headquarters of the two centres in Nairobi, as being of mutual benefit. The two centres have formal collaboration in a number of projects, and there are also informal collaborations in the areas of biometrics, GIS, and administration. The potential for collaboration with ICRAF has increased with the broadening of the ILRI mandate to address issues of natural resources management. With respect to ICIPE, there is the possibility for sharing facilities as well as collaboration in ticks and tickborne diseases as well as in tsetse and trypanosomosis.

Current collaborative arrangements are as follows:

Centre	Programme
CIAT, Colombia	Forage germplasm improvement; crop production; smallholder dairy; forage genetic resources
CIP, Peru	Crop livestock systems in the highlands
ICRAF, Kenya	Evaluation of fodder trees, fodder tree genetic resources
ICRISAT, India	Mixed crop-livestock production in the semi-arid zone (in Niger), identification and mapping of QTLs for anti-nutritional factors in crop residues, joint vertisol project.
IFPRI, USA	Livestock policies and natural resource management
IITA, Nigeria	The role of livestock and integration of forage and browse legumes into cropping systems
IPGRI, Italy	Germplasm collection and characterisation
ICIPE, Kenya	Epidemiology of trypanosomosis.
ICOMOD, Nepal	Highland agriculture and watershed management

ILRI currently has joint staff appointments with IITA, CIAT, IFPRI and CIP, while the Institute has outposted staff at the headquarters of research stations of ICRISAT, IITA,

and IRRI. In the latter cases, ILRI support staff are on the payroll and under the personnel policies of the host institution.

The Institute also participates in a series of ecoregional consortia that are discussed under section 10.4.3 below.

It further participates in five systemwide programmes: the Systemwide Livestock Programme for which ILRI serves as convenor, the Property Rights and Collective Action Initiative, the Systemwide Genetic Resources Programme, the Systemwide Programme on Integrated Pest Management, and the System-wide Soil Water Nutrient Programme.

10.4.1 Systemwide Livestock Programme (SLP)

The SLP, one of several systemwide programmes within the CGIAR, is convened by ILRI. The EPMR of ILRI was not asked to review the SLP, but to comment on ILRI's involvement and functions in this programme.

The aim of SLP is to add value to the resources invested in livestock-related research across the CGIAR system and associated ecoregional consortia. This is to be achieved through the development of a coherent, integrated approach to the development of livestock feeds, the management of natural resources, and the creation of a supportive policy environment for livestock development.

There are currently nine CGIAR Centres that participate in the SLP. Its research agenda is agreed to by the inter-Centre Livestock Programme Group (LPG) and to oversee the implementation. The LPG consists of a representative of each participating Centre and is chaired by the representative of the convening Centre, ILRI.

The SLP was established in 1995 and recommended by TAC to be funded at a volume of US\$ 4 million per year. In preparing for its implementation, a competitive grant system was agreed to and set up to assemble the Programme's research portfolio. This process resulted in the approval for funding of three separate proposals (by CIAT, ICRAF, ICARDA). Given that the funding of the Programme was not forthcoming at the level recommended by TAC and endorsed by the CGIAR, these proposals had to be redesigned and were funded only in 1997 at a considerably lower level than originally requested.

In late 1997, the World Bank awarded a "one-off" grant of US\$ 2 million to enable further development of the SLP, and ILRI decided, in 1998, to appoint a full-time co-ordinator and to solicit research proposals from member Centres for approval by the LPG and submission to donors.

ILRI considers the SLP to be one of two dimensions of its responsibilities in global livestock research (the other one being the Institute's own research within its global livestock research mandate). In its strategy document, ILRI has suggested a management structure for the SLP that blurs the distinction between the two dimensions, in that it introduces into the SLP core parts of ILRI's research programme for which the LPG has no programmatic and managerial responsibilities. This conveys to participants in the SLP and to the outside observer the unfortunate impression that ILRI is attempting to impose its own agenda on the SLP. This impression was indeed confirmed to the Panel by some SLP participants and further enhanced by the fact that ILRI's decision to appoint a full-time SLP co-ordinator in

1998 (drawing on programme-restricted and thus SLP funding) was made without prior consultation at the level of the inter-Centre Livestock Programme Group.

The Panel concurs with ILRI that the SLP is a powerful and necessary mechanism to synergise livestock-related activities across the CGIAR system. Any system-wide programme, however, can only thrive if there are genuine opportunities for consensus-based procedures of decision-making.

To address concerns on ILRI's integration of the convenor role in managing systemwide programmes of the CGIAR, the Panel recommends that ILRI:

- i) redefine its role in the Systemwide Livestock Programme (SLP) to conform with the TAC-recommended function of a systemwide programme convenor,**
- ii) withdraw those parts of its own research programme from the SLP over which the Inter-Centre Livestock Programme Group has no jurisdiction, thus enabling the entire portfolio of the Programme to be guided by procedures agreed in the SLP, and**
- iii) refrain from reporting the SLP as part of ILRI's research portfolio.**

10.4.2 Systemwide Genetic Resources Programme (SGRP)

ILRI participates actively in the SGRP, which is convened by IPGRI, and is represented on the steering committee, the Inter-Centre Working Group on Genetic Resources (ICWG-GR). An ILRI representative was on the executive committee of the SGRP in 1998. Currently, both ILRI and ICARDA, both working on livestock, are represented in the steering committee by plant geneticists because of their major commitment in conservation and designation of plant genetic resources under the agreement with FAO. An animal geneticist from ILRI has recently been invited to represent animal genetic resources issues on the SGRP steering committee.

ILRI contributes to the SGRP through its projects on forage and animal genetic resources. Project 10 (Characterisation and conservation of forage genetic resources), funded by the German Federal Ministry for Economic and Development (BMZ), is part of the SGRP activities. Through this project, ILRI has the responsibility for maintaining and managing, in accordance with the International Genebank Standards, the CGIAR forage genebank containing over 13,000 accession of forage grasses, legumes, and fodder tree species. The genebank, held in trust under the auspices of FAO, is part of the *ex situ* network of base collections. Maintenance and management of the genebank includes and correction of passport data, routine seed health check for seed-borne verification diseases, production and supply of forage seeds to users, and making information available to users through the System-wide Information Network for Genetic Resources (SINGER) on the Internet.

The SGRP reviewed the genebank in 1996 and made several recommendations, which ILRI continues to implement. Based on the recommendations: (1) ILRI maintains unique germplasm in a large base collection; discussions with CIAT and ICARDA on the location of the base collections are already in progress; (2) germination tests are continuing with priority given to base collections, although the tests are expected to take up to five years to complete;

(3) work on regeneration continues with more accessions planted in 1996 to 1998 and; (4) the project maintains close collaboration with other SGRP members, such as ICRAF, CIAT, IPGRI and ICARDA. Linkages are also maintained with NARS partners (such as the SADC regional genebank, Kenya genebank, and other collaborators), ARIs, (University of Wisconsin, Cornell University, University of Reading and CISRO), and FAO.

In 1996, the SGRP funded a meeting between the centres (ILRI, ICARDA and IPGRI) and FAO to identify areas of possible collaboration in the area of animal genetic resources. The meeting recommended that ILRI and ICARDA identify system-wide activities for which SGRP support could be sought. ILRI Projects 1 (Characterisation, conservation and use of animal genetic resources) and 2 (Development of disease resistant livestock) also contribute significantly to the SGRP and the global animal genetic resources conservation efforts. In collaboration with the NARS, ARIs and FAO, the Institute is working on the following research activities:

- identification and description of AnGR in developing countries;
- development of a database on indigenous animal genetic resources covering uses, characteristics (including production and adaptive attributes), distribution, population statistics, status (increasing, decreasing and stable), etc.;
- economic valuation of AnGR;
- training of NARS scientists in collaborating countries;
- genetic resistance to trypanosomosis; and
- genetic resistance to gastro-intestinal parasitism in small ruminants.

The projects had several achievements; one that can directly be linked to the SGRP is the development of the information system, Domestic Animal Genetic Resources Information Database (DAGRID). Discussions to make the information on livestock genetic resources available to users by linking DAGRID with SINGER are already in progress.

The Institute, through its parents, has a long history of collaboration with FAO in animal genetic resources. These collaborations include research, joint training programmes for the NARS, and workshops. The Projects 1 and 2 also maintains linkages and collaboration with the NARS and ARIs.

The Panel commends ILRI for significant progress made in implementing the recommendations of the SGRP Genebank Review and for developing and making available the animal genetic resources information as well as the forage germplasm databases and suggests that the Institute, in collaboration with the SGRP, ensure that the databases on forage germplasm and DAGRID are complementary to the global information systems maintained by FAO such as DAD-IS.

The Institute is now in a better position than ever to contribute to global efforts in research on animal genetic resources management. The establishment of global and regional institutional structures and facilities that can facilitate ILRI's participation in relevant activities has created an enabling environment. In order to enhance ILRI's contribution to the SGRP and other global efforts for the conservation of animal genetic resources, the Panel suggests that ILRI develop a policy statement with respect to the conservation of farm animal genetic resources and its role in these efforts. ILRI is thus encouraged to play a leading role within the SGRP in identifying policy and strategic research priorities in farm animal genetic

resources conservation and use to be addressed by the CGIAR, priorities that would enhance work done by the NARS, development agencies, and other partners.

10.4.3 ILRI's Involvement in Ecoregional Research

The term “ecoregional” was coined by TAC in reference to regionally defined agroecological zones. TAC proposed a conceptual dual-strategy to better balance international agricultural research to improve productivity in a sustainable manner, and for a “gradual transition in the organization of the global agricultural research system to meet the sustainability challenge” (The Ecological Approach to Research in the CGIAR. TAC Secretariat. 1993). TAC acknowledged the inherent appropriateness of “agroecological zones as an organising framework for research on the physical and biological aspects of the conservation and management of natural resources, including germplasm.” TAC also acknowledged that the socio-economic parameters shaping research are partly differentiated also by national and regional boundaries.

These two domains led to a conceptual ecoregional approach aimed at a global research model containing “biological, physical and human dimensions of long term sustainability.” This approach has three parts, which are quoted below (TAC, 1993).

- Applied and strategic research on the foundations of sustainable production systems in the ecoregion;
- The improvement of productivity in the ecoregion by drawing in appropriate global research activities; and
- Strengthening of the co-operation with national partners and the development of transnational mechanisms of collaboration.

The global expansion of ILRI's mandate utilises existing ecoregional consortia for research and NARS capacity building activities, and to facilitate technology adaptation and transfer to rural households. Benchmark sites in different geographic regions are selected to be representative of the agroecosystems within them and corresponding broad recommendation domains. The Systemwide Livestock Programme, focusing on animal feed and natural resource management in crop-livestock systems, also works through ecoregional consortia.

The Institute is involved with five ecoregional consortia, which are convened by five Centres and various collaborators. These consortia are:

- African Highlands Initiative, convened by ICRAF, and focusing on integrated natural resource management.
- Consortium for the Sustainable Development of the Andean Ecoregion (CONDESAN), convened by CIP, and focusing on sustainable production and natural resource management.
- Desert Margins Programme, convened by ICRISAT, and focusing on natural resource management in dry areas.

- Moist Savannah Consortium, convened by IITA, and focusing on sustainable production technologies.
- Tropileche, convened by CIAT, and focusing on improved forage utilisation, especially legumes, in smallholder systems with dual-purpose cattle lowland Latin America.

The ILRI Medium-term Plan, 1998-2000 indicates several activities that are ecoregional. In response to a TAC recommendation to increase livestock research investments “particularly in mixed farming systems”, ILRI responded with a decision to expand “activity with ecoregional partners in Asia, LAC and WANA” by basing “individual scientists and multidisciplinary teams outside Africa....at least eight scientists in Asia, four in LAC and one in WANA.” Research focuses on feeding constraints in crop-livestock systems, also incorporating systems and policy analyses. Research and testing is to be carried out with ecoregional partners, including “systems research across agroecological zones to facilitate transregional analysis and to broaden the recommendation domains.” Regional crop-livestock research projects were assessed in section 7.3, systems analysis in section 7.4, and policy analysis in chapter 8.

The Panel found it cumbersome to ascertain the specific objectives for ecoregional research and the merit of ILRI’s approach because “ecoregional” was undifferentiated from similar terms (e.g., agroecological, transregional), especially in the context of the ILRI mission. Therefore, the Panel considers it essential that the Institute differentially defines exactly what is meant by “ecoregional”, and how this activity contributes “on the margin” to ongoing research that is addressing agroecological and transregional issues. Furthermore, specific objectives and outputs to be gained from research inquiry need to be mapped out. The roles and knowledge contributions that are expected from outposted ILRI staff and from ecoregional partners should be clearly identified. As pointed out in Chapter 7, ILRI has valuable opportunities for intensifying transregional-*cum*-global research in market-oriented crop-livestock systems (section 7.3.3), which does not necessitate large staff outposts. The Institute needs to rethink the benefits to be expected and the *modus operandi* for an ecoregional or transregional dimension in its programmes.

10.5 ILRI Collaboration with FAO

FAO works closely with ILRI scientists in the field of animal health, namely tsetse and trypanosomosis, tick and tickborne disease, quantitative epidemiology, and genetic resistance. The Programme Against African Trypanosomosis (PAAT), initiated by FAO, WHO, IAEA, and OAU involves scientists from ILRI in a research advisory role. ILRI is presently collaborating with FAO in a feasibility study in applying the new ILRI-developed skills in epidemiology and GIS-based surveillance in the Southern Rift Valley of Ethiopia and in setting up Internet-based livestock research information facilities.

10.6 Collaborative Research with Advanced Research Institutions

Collaboration with ARIs takes two forms. In some cases, ILRI contracts with, and provides resources to, advanced institutions, in both developed and developing countries, to carry out specific aspects of research projects for which the Institute lacks expertise. ILRI

Board and Management have determined that this is the most cost-effective way to assemble the skills needed in some areas of research. The process is referred to as “outsourcing,” through which ILRI invested US\$ 539K in 1998. In other cases, ILRI collaborates on mutually agreed projects that coincide with the research agendas of both institutions and for which each side brings its own resources.

10.7 Visiting Scientists

ILRI currently has 13 visiting scientists on site, nine in Biosciences and four in Sustainable Production Systems. They range from senior scientists to post-doctoral fellows; most come from developed countries.

The initial point of contact is at the level of Project Co-ordinators, usually by an approach from an external scientist wanting to undertake research at ILRI. The PC then decides whether the proposed work fits with the priorities of the project and whether there are sufficient funds in the budget to provide the necessary support. The latter is handled on a case-by-case basis; it usually involves provision of housing but could include a salary component. In general, no bench fees are charged. There are a number of International schemes that specifically support visiting scientists. The PC would then seek approval from the Programme Director for the appointment of the visiting scientist. Most remain at ILRI for from one to two years, but two of those currently here have been with the Institute for eight and eighteen years, respectively.

10.8 ILRI and Public Awareness

ILRI's public awareness programme, a charge of the External Relations Office, targets, in the following order, donors; scientific and development decision-makers, including NARS; the media; and the general public.

It aims to create an awareness of the importance of the Institute's research, build a constituency for livestock research, and, ultimately, promote an increase in funding that will support it. Staff produce brochures (including a series highlighting ILRI's work as supported by specific donors), research briefs, posters, and videos, etc. Particular use is made of the Internet as a cost-effective delivery vehicle.

10.9 Management of ILRI's Partnerships

In view of the fact that ILRI has a multiplicity of partners of varying interests and capacities, the Panel has recommended in Chapter 5 that their co-ordination be a charge of the International Co-operation Programme. This does not suggest that IC would make the initial contact in all cases, nor be the principal manager of the relationship. It would be important, however, that there be a central point at the Institute where information would be readily available about each partner and each of the current areas of collaboration. Further, such a central point could become a point of co-ordination with respect to MOUs, MOAs, and other forms of contractual arrangements.

10.10 Summary

The main concern for national organizations is how to improve the effectiveness of research collaboration with ILRI. There is some sense that insufficient resources are allocated to collaborative projects, but also that resource and efforts invested by partners are marginal and under-valued by the Institute. There is, however, general acknowledgement of ILRI's importance and leadership in basic and strategic production systems and animal health. This acknowledgement covers the scientists, the support staff, the facilities, and the training and capacity strengthening capabilities. The Panel's survey question with respect to new areas for collaboration raised considerable interest and elicited a number of suggestions in which partners would welcome joint activities.

CHAPTER 11 - CROSS-CUTTING ISSUES

This chapter covers matters that affect the Institute and its activities as a whole and therefore required analysis and comment by the Panel. Some are matters of policy or international concern that can and do affect the way ILRI does its work. The subjects covered are: assuring science quality, impact of ILRI's research, globalisation, intellectual property rights, biosafety and bioethics and animal welfare.

11.1 Assuring the Quality of Science

What is "good science" - can we recognise it, and can it be evaluated? These questions are asked in almost every research institution, and are especially pertinent for ILRI because of its range of research activities from basic or strategic to applied, and its wide range of scientific disciplines. The Panel asked, what should be expected from strategic or applied livestock research and how can its scientific quality be assessed? To help set the stage, concepts and principles were reviewed that could be important in assuring scientific quality.

11.1.1 Good Science and Its Assessment

In his insightful book, The Joy of Science: Excellence and its Rewards, Sindermann (1985) defined 'good science' as: "...production of extensive data, rational insightful application of those data to hypotheses about natural events, and effective presentation of the resulting information and analysis to colleagues". This definition aims at individual scientists or teams of scientists with clear objectives, and deals not only with conduct of research but also in communicating results to others. Hence, publication of research results is an essential part of research and is important in evaluating scientific quality.

Sindermann went further in defining "good science" by proposing three categories along with some of their characteristics:

"good science" – 'sustained research productivity in a chosen area of subject matter, supported by substantive papers in major journals.

"very good science" – a series of major research papers over a period of years, which in the aggregate provide a substantial addition to knowledge in an area of subject matter, or definitive and creative reviews in a specific subject, or specialised books in an areas of expertise.

"excellent science" – could include a brilliant series of definitive research papers, exploring in depth a previously little-known phenomenon; a significant conceptual advance; a masterful elegant synthesis of the disparate data of others; or a definitive, award-winning textbook in a major scientific field.

Most science is carried out in organizations and institutions, therefore the way an institution plans and manages research has much to do with scientific quality. A research institution must develop a clear vision for itself and its work, set priorities, and define

strategies to carry out the work. If these are done well, excellent staff will be attracted and outstanding staff will be retained.

Institutional strength or core competence in science has been defined: *“A foundation of excellence in the practice of science constitutes the core of success, around which additional interpersonal embellishments may be added, but which can never replace the core”* (Sindermann, 1985). This definition appears to include the concept of ‘critical mass’; the Panel notes that ILRI has encapsulated this idea somewhat in its ‘platforms of essential capacity’.

Most scientists are happiest in a creative institution that is ‘going places’, that knows what it is doing and where it wants to go, and is likely to get there. Professional satisfaction is a powerful motivator, and morale of scientists often depends on whether or not their work is appreciated.

Some common methods used to measure and assure scientific quality include at least some of the topics below:

- Publication record (including quality of journals in which work is published).
- Citation analysis – a good way to determine how important or useful a publication is considered by other scientists.
- Peer review – an essential part of any scientific enterprise, and a check on ideas, value of research, and scientific recognition and affirmation.
- National or international recognition and awards – a way to measure where an individual scientist rates in his/her professional discipline in regard to scientific competence, leadership, and respect.
- Impact of the work on science or society – Impact is very difficult to measure, but answering some questions may help: Has the work changed the way research is done? Has it produced new ideas that open new doors? Could the development lead to new processes or important products? Will it add to the body of knowledge so as to advance a field or provide new insights or solutions to societal problems? Does it produce new methodologies?
- Staff evaluation procedures

11.1.2 ILRI’s Approach to Ensuring Scientific Quality

The Panel did not find it easy to understand ILRI’s system to assure science quality, finding it vague. However, some elements of a nascent system could be identified and are discussed below. There is no Publications Committee, and decisions about what can be published rest with project co-ordinators and the Programme Directors. Overall research quality is the responsibility of the Programme Directors.

Staff evaluation

ILRI uses a conventional staff appraisal system that begins with objectives and plans, and is highly dependent on the experience or skills of the supervisor(s) to deal with oversight, questions of output and quality of performance, and matters of career development. Assessment of both national and international staff is the responsibility of the Programme Directors. There has been and will be more supervisory training.

Centre Commissioned External Reviews (CCER)

ILRI's original thinking was that CCERs: *"..offer an excellent opportunity to gain the perspective of qualified experts on the merits of recent and current programmes and to provide a reaction to proposed future directions. The term **merit** is intended to include both the **scientific quality** and the utility of the products being judged"* (Agenda Brief, ILRI Board of Trustees, April 16-19, 1996).

The ILRI Board commissioned five CCERs during the review period: Production Systems Research (1995), Systems Analysis and Impact Assessment (1996), Livestock Policy Analysis (1996), Animal Health Improvement (1996), and Information Services (1997). A main purpose of these CCERs was to help ILRI during its formative years and to help prepare ILRI's first MTP. Peer evaluation of ongoing research was considered essential to link the differing cultures of the two former institutions and *"to ensure quality and utility and applicability of ILRI's products in practice"*. Indeed, CCERs became a key part of ILRI's planning process and were asked by the Board *"to review briefly progress and accomplishments, but to focus on the future plans of the area under review"*, and to develop *"a critical external review of the plan"*.

The Animal Health Improvement CCER panel commented on science quality, terming it; *"...outstanding, strategic... high quality of science.."*. The CCER on Livestock Policy Analysis commented: *".... very favourably impressed by ...quality and relevance of the research...mix of cutting-edge scientific...and... conventional approaches"*. The CCER on Production Systems Research stated; *"..a tendency for some... work ... to be rather pedestrian. ...pay more attention to its strategic thinking, visionary approach and innovative research in PSR"*. The Panel noted that the methods of assessing quality were not stated clearly in these reviews, and that more attention was given to assessing ILRI's future plans.

Panel Comment: In its Terms of Reference from the TAC Chairman the Panel was asked to evaluate science quality and the role CCERs had in its assessment. The Panel regretted that the CCERs were used more for planning or reviewing plans than for assessing scientific quality, concluding that most were weak or lacking in such assessments. The Panel considers it essential that future Terms of Reference for CCERs state specifically the need to assess science quality rigorously and the assessment methods and indicators that should be used.

Publications

In preparing for the EPMR, ILRI assessed its publications from 1992-1997, and especially 1994-97. Since 1992 these totalled 1558, including 774 journal articles. Since ILRI's establishment in 1995, 741 in total were produced, 339 in refereed journals. In 1990, 42% of all CGIAR publications were in refereed journals; the figure for ILCA was 31%, and

for ILRAD was 89%, the highest of all CGIAR centres. During 1992-97, 50% of ILRAD/ILCA/ILRI publications were in refereed journals.

In 1993, average CGIAR publications per scientist totalled 1.38, of which 0.58 were journal articles; corresponding figures for ILRAD/ILCA/ILRI (including graduate students) during 1992-97 were 1.45 and 0.73, respectively. However, during 1995-97 after ILRI's international scientist numbers dropped from 116 in 1992-94 to 97 (1995-97), one result was higher average rates per scientist, 2.48 and 1.23, respectively. Journal numbers per scientist before ILRI was established (1992-94) were 1.25, and after ILRI was established, 1.16.

Publication rates (1994-97) for the Programmes were: Biosciences, total 452, journal articles 296; Sustainable Production Systems, total 481, journal articles 177; SPAN, total 38, journal articles 1.

During 1992-97 ILRAD/ILCA/ILRI scientists published in 186 journals, including Nature, Genetics and Science. Thirty-nine journals account for 549 of the 774 articles published; these journals range over a wide number of fields from pastures to biotechnology and molecular parasitology.

Panel Comment: The Panel found ILRI publications difficult to evaluate, partly because of the carryover from ILRAD and ILCA, and partly because various reports on ILRI's publication record that were received by the Panel were not in agreement, e.g. in terms of inclusion non-refereed journals or not, counting the same publication more than once, and discrepancies in numbers of publications by projects.

To monitor and target ILRI's reporting of scientific findings, the Panel urges that: 1) a portfolio of priority journals be identified for the reporting of original research; 2) journal articles be catalogued by research theme (or platform), programme, and author, distinguishing past employees and outside collaborators from current staff; and 3) these procedures also be used for other publications. This would enable the Institute to describe, quantify, and monitor the quality and flows of information from its research programmes to selected audiences.

Annual Programme Meetings (APM)

Annual Programme Meetings are intended to provide a means for peer review and science quality assurance within ILRI, but the Panel saw no evidence of these at the September, 1998 meeting in Addis Ababa.

Panel Comment: The Panel believes the APM could be useful for peer review and for quality assurance, but that more detailed presentations and incisive discussions would be required to make them effective in this regard.

11.1.3 Assessment

After considerable thought, the Panel surmised that one way to approach science quality at ILRI was to use (with apologies to Charles Dickens) the concepts of *science past*, *science present* and *science future* in particular to help to understand the influence the former ILCA and ILRAD had on ILRI and its scientific quality. For example, ILRAD was considered as doing high quality strategic (and basic) research, some of it considered not only

world-class but also making new research possible (e.g., developing methods to grow trypanosomes *in vitro*). Many ILRAD publications were considered to be of high quality and the work was considered excellent. The Panel noted that some ILRAD research was published after ILRI was formed, many by scientists never at ILRI, but whose articles count as ILRI publications. This work could be classified as *science past*, in that ILRAD's products are still emerging and influencing ILRI's present work, but how do (or should) they count in assessing ILRI's science quality?

On the other hand, ILCA from its beginning was often criticised for lack of focus; further, criticisms were heard about research quality, that its research did not meet standards expected of an international centre, and that it lacked achievements or impact. A notable exception was the Trypanotolerant Livestock Network, where both research quality and publications were well regarded. The Panel concluded some of ILCA still bears on ILRI's *science past*, and the carryover of much of ILCA's research agenda affects ILRI's *science present*. Also, as with ILRAD, some former ILCA staff are no longer (or never were) at ILRI, including some with impressive research and publication records.

So now we come to ILRI's *science present*, which is an amalgam of two former institutes -- adjusted and modified since 1995-- plus new activities, some relating to its global strategy. But how do we assess *science present*? How much do we go back to ILCA and ILRAD and their mandates and activities, or do we just start today as if those centres never existed? And do we ascribe science advances made - or not made - to ILRI alone? Publications cannot help much because of issues of *science past*. Neither are CCERs of much help, because they were used more in planning than in assessing science quality. Further, some ILRI scientists may enjoy high standing, but how much is a reflection of *science past*, and how much is *science present*? The Panel believes assessments of science quality must be done at sub-project, project, programme and Institute level, but questions how these can be done without bringing in matters of both *science past* and *science present*.

We turn now to impact analysis. *Ex post* assessments by their nature relate to *science past*. The question is, should past impacts count to ILRI, or just be counted to global livestock research in general and assigned to the legacy of ILRI and its predecessors? *Ex ante* assessments are estimates of potential impact and their role in quality assessment is uncertain. It could be argued that *ex ante* assessments are geared toward both *science present* and *science future*, and while necessary, are not sufficient to measure quality.

That brings us to *science future*. Can assessments of quality of *science past* and *science present* help to predict ILRI's future science quality? The Panel believes they can, if its vision, priorities, and strategies are clearly defined. *Science future* depends largely on how ILRI goes about its business, including developing rigorous mechanisms to ensure high quality science. A clear commitment to quality will attract and hold outstanding scientists. It is possible of course that some 'ghosts' of *science past* and *science present* will still be around to affect ILRI's *science future*, but it the hope of the Panel that they will be mostly positive or at least benign.

One last thought on *science future* at ILRI. It may be possible that the 'snapshot' our Panel had of the Institute might have overestimated (or underestimated) science quality in some projects or activities, and that some areas might be weaker (or stronger) than we thought. Therefore, the Panel tried to complement its assessment using a matrix scoring system for quality for all projects, which is discussed below.

Assessing ILRI's Science Quality Today (*Science present*)

The Panel is convinced that ILRI with its global mandate must know where it is going, have clear plans to focus on a few very important topics, and allow its scientists the freedom and support to use their intellect and creative talents to solve them. Because of this, the Panel believes that ILRI, by setting clear priorities and laying out appropriate strategies, will affect positively its scientific quality.

The Panel was concerned that ILRI may be too budget-driven, compared with assuring efficient use of the funds in hand, and that this may affect science quality. The constant quest for restricted funds may result in erosion of core scientific competence – ILRI's 'platforms of essential capacity'.

A Matrix Scoring Approach Used by the Panel in Its Assessment

Because some of the approaches or elements of assessment used by ILRI did not fully satisfy, a matrix scoring system was used to assist the Panel in its analysis.

To assess overall quality and output of individual projects and of each research programme, the Panel devised a simple method of matrix scoring composed of five factors. These factors were: overall scientific quality, publication quality, output, critical mass, and research focus. The scoring scale contained values ranging from 1 to 5, centred on a median score of '3'. The median score was equated to Sindermann's definition of "good science", or "... production of extensive data, rational insightful application of those data to hypotheses about natural events, and effective presentation of the resulting information and analysis to colleagues". Larger values represented higher quality and smaller values represented less quality, and the need for managerial action.

The Panel's position was that every publication of original research by ILRI should meet or exceed the criterion of 'good science' – it is the minimum threshold of science quality for a CGIAR centre. Consequently, programme areas or research themes that fall short identify a potential need for adjustment or other action.

While this process is not entirely objective, as could have been achieved with more time and information, the Panel considered that the results provided a useful approximate overview of general trends and possible reasons for quality variations. The method was applied to each research project, and salient results were discussed briefly in the Summary sections of Chapters 6 and 7. The assessment of overall quality utilised two principal explanatory factors – research focus and critical mass. This is the sort of assessment process that Management could undertake to identify areas of strengths and weakness, and to help determine appropriate interventions to improve or maintain the quality of science.

Analysis of the resulting matrix of scores covering the 19 research projects led to the following working-level interpretations:

- The overall quality assessment showed that 60% of the projects were scored greater than or equal to very good; 28% of good quality; and about 12% unsatisfactory, indicating substantial room for improvement. Additional considerations of output combined with publication quality showed that 35% of the projects were scored equal to or better than very good, 35% were

good, and 30% were unsatisfactory. Only 5% of the projects were rated as excellent.

- A key issue for improving the output and quality is to focus on a specific set of high priority objectives and to concentrate efforts on greater output and first rate quality. Some 50% of projects showed good focus, which was roughly correlated with the amount and quality of output, and highlighting the need for greater research focus. About 22% scored unsatisfactory for focus.
- The Panel considers that certain projects also lack critical mass, and this could be inhibiting output.
- The analysis suggests that most ILRI research meets acceptable criteria of good science. The research programme of an international centre should be highly visible with significant outputs of very good and excellent science across all of its projects.
- The Panel's preliminary analysis suggests a potential fragility in ILRI's science quality, given the relatively small proportion of projects with outputs or quality that rate as excellent and the proportion below minimum standard. The compounded effects from losses in key staff members, difficulties in recruitment, variations in funding and increasing dependence on restricted funding could strain certain projects and jeopardise quality and output. These factors call for appropriate early measures to improve ILRI's science quality.

The Panel's analysis indicates that ILRI has some elements that could be used to construct a mechanism for scientific quality assurance. A number of possible methods are presented in Section 11.1.1. The Panel believes a strong Publications Committee would be needed. CCERs and the Annual Programme Meetings could be used better for peer review and scientific quality assessment. ILRI also has scientists who have received recognition by professional societies or other distinctions of honour. What is needed is a clear mechanism to ensure science quality at every level in the Institute.

To maintain and enhance ILRI's scientific reputation, the Panel recommends that the Institute develop and use explicit mechanisms to ensure scientific quality and the effectiveness and utility of its outputs.

11.2 The Impact of ILRI

Over some 20 years ILRAD and ILCA invested close to US\$ 500 million in research. Since ILRI was established, its investments added a further US\$ 100 million to that figure. TAC and CGIAR have expressed concern regarding the impact of ILRI research.

The pertinent chapters in this report have reported, albeit not comprehensively, ILRI's outputs and achievements in its various projects. Also, the preceding section in this Chapter tells how the Panel went about assessing the quality of science. The Centre has not submitted a document that would attempt an aggregate appraisal of ILRI's impact. Such an assessment

would have allowed ILRI to present the results of the last four years, on the basis of the investments made in the previous years. However, the analysis performed by project 11, referred to in Chapter 8, has made a major effort to shed light on impact of the Institute's work in a wide range of areas. The Panel commends ILRI for this valuable information.

Considering the analysis in the previous chapters, the conclusion of the Panel is that the direct farm level impact of ILRI is so far rather limited, although quite substantial local and regional uptake of some of the technologies produced is reported. The Panel noted particularly the considerable adoption of the fodder bank technology in West Africa and of the Vertisol management technology in Ethiopia. In 1998 the latter technology was selected as one of 40 outstanding innovative projects by the Third World Network of Scientific Organizations of UNDP.

Also, ILRI has produced a significant number of publications and journal articles. They have contributed to increased knowledge and awareness, yet it is hardly possible to evaluate their impact without a specific analysis. In this case the issue of impact on ultimate users is even more difficult to assess and information to do this is not fully available.

The output of ILRI's research is diverse, including knowledge generated by diagnostics and publications, equipment designs, processes for production, and research methods. These outputs go through several stages until they become outcomes ready for transfer and until they eventually reach ultimate users. Furthermore, outputs of research enter the stream of adoption and there may be additional interventions required, particularly for the transformation of such outputs into final inputs, products and services where transaction costs and market failures may, in addition, largely determine uptake.

ILRI is encouraged to continue its ongoing effort to assess its overall impact over the last four years as a basis for its strategic orientation.

11.3 Globalisation of ILRI's Agenda

A principal recommendation resulting from the review of international livestock research, leading to the formation of ILRI in 1994/5 was to expand CGIAR livestock research so far primarily focused on Africa to a broader portfolio which addressed priorities on a global scale. The founding documents prepared under the aegis of the Rockefeller Foundation and later adopted by the ILRI Board of Trustees in the Strategic Plan identified two kinds of system-wide responsibilities for the new Institute: (1) a global mandate for livestock research by the new Institute, and (2) a convenor role with a mandate to provide leadership in co-ordination and communication about livestock related research. The latter role has since been specified in the context of the System-wide Livestock Programme (SLP) for which ILRI has assumed convening responsibilities. The Panel has recommended an adjustment of ILRI's interpretation of the convenor function in Chapter 10.

The Panel wishes to stress that it strongly endorses the decision to expand the mandate of the unified Institute to the global dimension, although it realises that the funding situation since 1994, when the Institute received this Mandate, was not favourable to major deployments in this regard.

When analysing ILRI's approach to the design and implementation of its global agenda, on the other hand, the Panel had some difficulties to establish in detail how the Centre exactly interpreted its global mandate and how it intended to go about fulfilling this.

In the introduction of the global mandate, ILRI's strategic plan first considers global needs for livestock research and the relative capacities of institutes both within and outside the CGIAR to contribute to the research goals. It then identifies broad research opportunities to improve animal performance, systems productivity and livestock sector performance and technology transfer. Research opportunities of global relevance identified for ILRI were addressed in this broad context and are addressed below:

- ruminant health (vector-borne tropical diseases), development of new control technologies, epidemiological methods
- genetics of disease tolerance
- ecoregional systems research on feed sources, quality and utilisation
- livestock system research and impact analysis
- natural resource management, contribution of livestock

Since 1995, ILRI has conducted a series of consultations with relevant institutions outside Africa to help establish priorities within the broadened agenda for livestock research. This coincided with the inception of the System-wide Livestock Programme for which ILRI accepted convenor responsibilities.

For the current MTP (1998-2000), ILRI addresses its expanded global mandate in two ways:

- by expanding recommendation domains for strategic research outside Africa
- by placing multidisciplinary teams in Asia, LAC and WANA

ILRI's research output is designed to generate international public goods with relevance beyond the boundaries of the location or region in which they are generated. Such strategic research, for which valid recommendation domains should be feasible, are the areas of parasite biology, bovine immunology, genetics of disease resistance, diagnostic and vaccine technologies, epidemiology, rumen microbiology and phytochemistry. In addition, systems analysis and impact assessment assist in targeting research.

In addition to such expansion of the relevance of ILRI's research, the Institute considers that it is equally important to base individual scientists and scientist teams outside Africa. Progress on this front was far less dynamic than anticipated due to slow donor response to this initiative. The Institute has made it clear that further expansion of these activities would only occur if entirely funded through project restricted resources. This implies ILRI's decision to preferentially treat its Africa – based activities. The Panel believes that this is a prudent and well justified policy, provided the Institute submits the entire Africa-based portfolio to continuous, rigorous scrutiny for quality, strategic value and output to confirm or reject its international public goods nature. If this was rigorously done, the opportunities lost outside Africa by applying the above policy could be valued correctly and put in perspective. As indicated in Chapter 3, the Panel has not found evidence that the Centre has the process and the procedures in place to systematically do that.

It is unavoidable under these circumstances that interpretation and implementation of the Centre's global mandate run the risk of being perceived as opportunistic. The Panel does not suggest that this is the case; it expects, however, that a compelling institutional vision and a concise institutional strategy, coupled with rigorous, systematic priority-setting and effective and efficient planning, monitoring and evaluation of the Institute's portfolio – as suggested in Chapter 3 – will strengthen the Institute's global dimension very substantially.

The Panel believes that the Institute needs to promulgate a clear policy on its globalisation approach, which establishes criteria to be applied in both dimensions of this approach; in particular, this policy would have to provide the evidence for the strategic nature of the choice of location and system when ILRI platforms of capacity are established outside Africa.

11.4 Intellectual Property Rights

In its collaboration with partners, ILRI is concerned that it may be hampered or affected by IPR concerns. This may be in regard to working relationships with NARS, ARIs or – perhaps even more so – the private sector. IPR concerns relate to genetic resources (e.g., plant genetic resources that ILRI holds in trust); to the property of others used in research (e.g., specialised proprietary materials needed in biotechnology research), or to processes or products that ILRI may discover in their own research (e.g., vaccines, methods). Matters of special concern include: access to and transfer of germplasm, IPR and patenting of the results of ILRI research; and use of biotechnology and proprietary materials.

ILRI holds one patent, 'Vaccines for the protection of animals against *Theileria* infection'; this patent has been granted in both Kenya (Pat. No. KE/P/90/00002, dated August 29, 1994) and the USA (Pat. No. 5,273,744, dated Dec. 28, 1993).

An *ad hoc* Joint Board-Management Committee developed a Policy on Intellectual Property Rights, Biosafety and Bioethics that was provisionally adopted for one year by the Board in September, 1998. After testing the draft policy for six months, a report and draft version for adoption will be presented at the September 1999 Board meeting. The Board also endorsed the establishment of an Intellectual Property Rights Committee to address issues of policy and guidelines, review and approve material transfer agreements, and to facilitate confidentiality agreements and proposals through e-mail.

The Panel welcomes development of an ILRI Intellectual Property policy and the plans for its implementation as the policy is tested in practice. The Panel understands that questions concerning IPR often require management on a case by case basis, and believes that ILRI is well on its way to resolving most of the matters that may arise.

The Panel believes that the IPR systems that are adopted by collaborating organizations need to be considered in relation to ILRI's own IPR policy and management system. In particular, it is important that IPR issues do not inhibit effective collaboration and that the requirements for entering into any agreement are considered rationally on a case by case basis. It would also be important to set up criteria for deciding when IPR agreements may be required, rather than having a blanket system in which such agreements are required for all activities.

11.5 Biosafety

The ILRI Policy discussed in 11.4 above also covers biosafety. The Board has authorised the appointment of a biosafety officer to oversee implementation of the policy. ILRI has a secure biosafety containment facility.

It is critical in the laboratory-based work that recognised standards and procedures are implemented, and that each laboratory has a clear-cut definition of its responsibilities related thereto. This is particularly important in relation to the pathogens themselves, genetic modification of pathogens and gene cloning where issues of possible escape into the environment may be involved.

11.6 Bioethics and Animal Welfare

As with biosafety, the ILRI Policy discussed in 11.4 also covers bioethics and emphasises four topics: equity; trusteeship of genetic resources; respect, responsibility and integrity in science; and social benefits.

ILRI's Animal Care and Use Committee meets on a regular basis and its guidelines are based on the very strict UK system.

The Panel commends ILRI for setting up effective bioethics regulations and for their systematic implementation.

CHAPTER 12 - ADMINISTRATION

12.1 Introduction

ILRI's Director of Administration, posted at Nairobi, leads five divisions: Financial Management, Human Resources Management, Information Technology Services, and Administration in Nairobi and in Addis Ababa. Division heads are all internationally recruited staff and, except for the last named, operate from Nairobi. The work of these units is co-ordinated through quarterly meetings of the Administrative Management Committee (AMC). Three other international staff report to their respective Heads of Administration: the Head of Physical Plant and the Housing and Catering Manager, both in Addis, and the Head of Engineering, Nairobi. In addition, the Director serves as Secretary to the Board of Trustees and currently oversees the work of the Internal Auditor. The current Director of Administration will retire shortly after the completion of this review and will be replaced by a well-qualified person who has been hired from a similar position at ICRAF.

In general, administrative services are very efficiently provided, and there are now few issues of concern other than in human resources as discussed below. Problems have been experienced in past years in the Engineering Department, where evidence of severe corruption was uncovered and dealt with firmly, and in the security force. That, too, has been rectified; a relatively new security firm has been engaged and has agreed to a deduction in the fee should any items of value be discovered to be missing.

12.2 Financial Management

During the first year of ILRI's operation, the financial records were managed separately in Nairobi and Addis Ababa, with consolidated accounts prepared more or less by hand on a monthly basis. During the course of 1995, detailed planning took place to analyse the discrete systems and achieve full integration. The Chief Financial Officer (CFO) now oversees accounting units located in Nairobi and Addis Ababa and a corporate budget office located in Addis that also handles procurement for that site; locally-recruited staff of the three units number approximately 30. Operating manuals are in place at both sites. Financial management for ILRI staff posted elsewhere is handled by the respective host institution with reports sent to Nairobi monthly for incorporation into the Institute-level reports. These are normally issued by the 17th of the month to some 129 cost centre managers with consolidated reports sent to the several levels of upper management. After careful probing on the Panel's part, programme staff seem satisfied with the management reports and other financial services provided.

The CFO, who had been with ILRI from the outset and was previously with ILCA, left to join another part of the CGIAR System in November 1998. The recruitment process for his replacement is now nearing completion.

Panel members met with ILRI's current external auditors--Deloitte & Touche, who commenced work with the Institute in 1997 and will now proceed to audit the 1998 financial

reports. The relevant partner and audit manager assured the Panel that ILRI's system is reliable from the perspective of controls and the accuracy of the financial information. They have uncovered no evidence of the mishandling of Institute assets. The auditors support the need for a common computer software system in both sites as a move toward greater efficiency, and this will soon be realised. In their 1997 management letter, they proposed that ILRI improve its procedures with regard to the verification of fixed assets. They suggest, in fact, that the Board consider a policy calling for full physical verification every three years and note that this could be done on a rotational basis. The external auditors regularly review the internal audit reports as well as the accounting records and procedures.

At the time of the establishment of ILRI, the two finance divisions were using different, but compatible, dos-based accounting packages. As they were considered adequate, and as a number of CGIAR Centres were then experimenting with various packages and the System considering standardisation, Management decided to retain the existing software until a satisfactory Windows-based system appeared on the market. Several widely used systems have been reviewed over the past year, but a final decision has not yet been made. Plans are to install a new system before the end of 1999, but, in any event, the current accounting software is fully Y2K compliant. It is expected that the system selected will incorporate procurement, fixed asset and stores controls and will interface with the Institute's human resources software.

The Finance Division issues budget guidelines, including the allocation of unrestricted core as determined by the IMC, in September of each year, immediately following the Annual Programme Meeting. Draft budgets are due back in mid-November, and an approved operating budget is normally in place by the end of December. Adjustments are made on an *ad hoc* basis as information on funding is received. The Budget Officer monitors realised income and expenditure throughout the year and sends out notices as needed. As is frequently the case, scientific staff have difficulty with the budget exercise and with financial control, and the Panel **suggests** that training in this area would be useful for them and a substantial benefit to Management.

Although ILCA staff were accustomed to a system of time charging, the procedure was not carried over to the new Institute. ILRI now has cross-project, cross-programme budgeting but no mechanism to measure staff time usage after the fact. As it is, of course, important to know the real cost of a research project as future activities are planned, and as staff costs make up the bulk of expenses, the Panel **suggests** that ILRI review past experience and consider implementation of time charging.

12.3 Human Resources Management

The EPMP Panel that reviewed ILCA in 1993 recommended that the Personnel Division should improve its performance and image as a service office. In response, the new ILRI has taken a number of steps to upgrade the quality of its human resources management. In its first two years, a consultant was retained to address the establishment and implementation of procedures for performance appraisal and position classification as well as to develop salary scales for international and local staff. During this period, the role of the Nominating Committee of the Board was expanded to focus on human resource issues as they relate to staff as well as Board. Staff councils for both NRS and IRS were established in 1996, this in acknowledgement of a recommendation stemming from the final ILRAD

review. Constitutions for both groups were formulated, and a subsequent Board/Management/staff agreement provided for representatives to meet regularly with the Human Resources Committee of the Board, after first presenting issues for discussion with Management at the IMC.

ILRI's locally recruited staff now total 716 close to the 1995 figure. 282 are posted to Addis Ababa, 88 at the Debre Zeit station, and 346 in Nairobi.. Currently, there are 127 internationally recruited staff, a decrease from 137 at the end of 1995. There is a trend towards shorter-term appointments, and the figure 127 includes 12 post-doctoral fellows, 13 visiting scientists, and 12 consultants. The IRS represent 38 nationalities, with 38% originating in countries of the South, slightly lower than the CGIAR average of 41%. Women number 26 of this group, still just 20 % of the total despite a recommendation in the last ILRAD review that called for "actions to ensure that women become more than the current 17% of the international staff." ILRI's percentage is, however, above the CGIAR 1997 average of 16%. No women are in senior Management; two of 21 or 10% hold middle management positions.

In January 1997, a professional Human Resources Manager at an international level was hired. By general consent, the HR function has improved since then. The HR Manager attends meetings of the IMC when relevant issues are to be discussed. In the course of the same year, representatives of the CGIAR Gender Programme were brought in to conduct a diagnostic review of gender staffing that yielded a number of broadly beneficial recommendations. ILRI has chosen to consider the gender issues raised in the report from the broader context of diversity and to establish a Diversity Task Force to make recommendations to Management regarding the improvement of policy and practices that will enable the Institute to capitalise more effectively on the contributions of its diverse staff.

ILRI has recognised the need to upgrade the management skills of staff and has organized courses in supervisory development for IRS and NRS in the last two years. Importantly, the Institute also sponsored a week-long management development course for project co-ordinators, senior administrators and directors in 1998. The course, which included skill-building in conflict resolution, facilitation, and team-building, was enthusiastically received by participants. Another facilitated course for middle and senior managers is planned for mid-1999. This kind of staff training will grow in importance as ILRI continues to build its partnerships and as the outsourcing of research becomes increasingly the rule. In this event, it will be essential for current staff to acquire—or for ILRI to recruit staff who possess—well-honed research management skills.

Policies and procedures with respect to human resources are well documented. They include well-drafted personnel policy manuals for IRS and NRS, classification manuals for both groups, performance appraisal manuals for several staff levels, and IRS staffing procedures. Local staff who work with ILRI scientists at outreach sites are the employees of the respective host institution, with their status governed by its policies. As is frequently the case with respect to such practices as performance management and appraisal, supervisory staff could benefit from special training.

The Human Resources Division produces a weekly staff newsletter that includes news from the directorate; announcements of staff arrivals, departures, etc.; notice of seminars and news of relevant events in Addis, Nairobi, and the outpost sites, as well as the CGIAR System.

Human resources management in international organizations in developing countries presents special challenges. One must consider the very wide, although inevitable, differential in the compensation levels of IRS and NRS staff, the diverse cultural practices and personal behaviours of a multi-ethnic staff, differences in discipline paradigms as staff collaborate in research teams, all this in a climate of uncertain funding with the pressure to expand and to demonstrate impact. ILRI has recognised the need for professionalism in this area of management but would probably benefit from additional skilled manpower. The Institute's staff is large, based at two main and a variety of smaller sites, and there are a number of issues that concern staff and demand attention. The delay in finding solutions to the concerns is a principal source of discontent in itself.

Both IRS and NRS Councils will bring to the forthcoming meeting of the Board's Human Resources Committee their positions with respect to compensation. At the IRS level, there has been some turmoil over the past year or so on the question of classification levels and related salaries. The number of levels has been reduced so that there are no longer clear definitions of positions of growing authority and responsibility for IRS staff, nor are there published salary schedules. Without such transparent criteria, staff legitimately fear salaries are determined on an ad hoc basis, without principles to preclude gender or nationality bias. ILRI Management speaks of determining IRS salaries on the basis of market value. This is a valid concept insofar as it takes into account discipline scarcity, qualifications, and experience. In an international organization, however, the Panel contends that it is not valid to consider the prior or future job market of candidates or staff insofar as it might differ by reason of gender or nationality. Equity, a concept to which the entire CGIAR System subscribes in all aspects of its work, surely prescribes equal pay for equal work of its human resources.

Because ILRI does not have an adequately defined and transparent system with which to classify internationally recruited staff (IRS), determine salaries, and ensure equity in compensation, the Panel recommends that:

- i) the categories of scientist, programme specialist, and administrator be expanded to differentiate positions with differing levels of responsibility, authority, knowledge, and skills;**
- ii) a salary range for each IRS level be developed and applied in all cases;**
- iii) where, in infrequent instances, market values for particular skills necessitate payment of a salary higher than that of equivalent positions, a market supplement be given to attract and retain suitable candidates; and**
- iv) information on the policies and procedures of the classification and compensation system be provided to all IRS staff.**

NRS Staff in both Kenya and Ethiopia are faced with difficult economic conditions and a deteriorating job market that presents them with few options. Advancement for them at a CGIAR Centre is limited, and this is a legitimate source of discontent. They bring to the table a number of concerns about the benefit package, but the most serious relates to a stipulation in the compensation plan developed in ILRI's first year. While each of the classification levels has ten pay steps, staff cannot progress beyond step six without three

consecutive annual ratings of “superior,” nor beyond step eight without three consecutive annual ratings of “outstanding.” Since in any well-managed appraisal scheme, these ratings should be given sparingly, the great majority of staff are locked in at step six. In concert with a market that constrains salaries because of high unemployment yet with rising living costs, such a restraint on salary increases can create a serious morale problem. It may also result in staff seeking second and third sources of income with a negative effect on their productivity at ILRI—or in taking unacceptable steps to assure they can provide for their families. Issues of NRS compensation are far too complex for the Panel to provide specific recommendations. Rather, the Panel **suggests** that Management make review of the entire package a priority over the next year.

A separate NRS compensation issue relates to the large number of casual staff (some 200 in Ethiopia, about 20 in Kenya) who have worked essentially full time for ILRI over many years. Many, of course, were inherited from ILRAD and ILCA. These staff work side by side with regular employees and carry out the same tasks, but receive far less compensation and few benefits. Administration is in the process of investigating the status of these workers, identifying those that need to be retained for a reasonable length of time, and determining the costs of regularising their employment. The Panel urges a prompt and an equitable resolution of this situation.

As noted elsewhere, relations between IRS and NRS are a sensitive matter in all international institutions. ILRI’s Diversity Task Force will consider ways to strengthen relationships both from a social and work-related perspective. New plans for the dining services that will promote more interaction will have an impact on the former. Other actions might include: a thorough review of benefits to determine if they can be more analogous, where there is no transparent reason for a differential; production of a single personnel manual—albeit with the needed distinctions clear—that could send the message that ILRI has one staff; participation of the Director General in periodic meetings of both staff councils.

Finally, there is a legitimate concern about the Institute’s ability to recruit highly qualified scientific staff. Questions of personal and family security and worry about funding and thus job security come into play here. ILRI attracts some 21 scientist applicants per post on average, compared to a CGIAR figure of 42. To counteract these realities, the Institute needs to cast its net much more widely and reach out to specific discipline journals as well as count on its current staff to help spread the word as they travel and attend professional meetings. The extra expense involved is well justified.

It is important to reiterate here that both IRS and NRS say that ILRI is a good place to work. The challenges are satisfying, the facilities excellent; they are offered the opportunity to bring their concerns to Management and Board. Still, this response is never to be taken for granted. Staff are, indeed, the Institute’s most valuable resource.

12.4 Information Technology Services

IT services are handled by an internationally recruited Head of Information and Technology in Nairobi assisted by a local Computer Manager in Addis and approximately seven local staff. The Head, a relatively new recruit to ILRI, plans to develop a staff user group to help out with application support to their colleagues and a supplement to his staff. The division lacks personnel to adjust applications, and staff try to procure off-the-shelf

packages that include adjustment services. Some software design is outsourced. A common hardware/software acquisition programme is in place, and controls ensure that appropriate licenses are obtained. New servers are on order that will speed access to the Internet as well as ILRI's Intranet and that will, of course, be Y2K compliant.

The Institute's computers are 80% Y2K compliant; the remainder can be manually adjusted. However, with the computers currently on order, ILRI will be 95% compliant by July 1999. The laboratory equipment has been checked for compliance as well. The principal concern is for the custom software used by some staff, often obtained from a variety of partners some time ago and likely not regularly maintained.

The IT division also handles the Institute's communications that, to a considerable extent, continue to be problematic. Although Nairobi is on the CGNET IVDN, Addis is not, and communications between the two sites is often difficult. Management is seeking permission to install microwave connections from the two principal offices to the central exchanges in the host cities; if approved, this should greatly reduce the interruptions experienced.

12.5 Internal Auditing

ILRI's experienced internal auditor, who normally works with one assistant and one secretary, is based in Ethiopia but spends on average two months each year in Nairobi. Another assistant auditor position in Kenya is currently vacant. The auditor also visited several ILRI outposts more than two years ago and would like to increase the frequency, especially since these offices are not covered by the external auditors.

The team prepares an annual audit plan for review by, and sends very detailed and thorough reports to, the Director of Administration. As specific issues arise during the year, however, the auditor adjusts the team's work schedules accordingly. He makes a point of following up on implementation of all of the recommendations made in his reports.

The audit reports reviewed focus mainly on financial policies and procedures and might usefully expand to consider other operational processes and take a broader approach that would look beyond compliance to the improvement of management systems. Of equal importance, the Panel believes the internal auditor should report to higher authority rather than to the office whose assignment he is principally auditing and **suggests** that he regularly present his workplan and the resulting reports to both the Director General and the Finance Committee of the Board.

12.6 Administration

The respective Heads of Administration in Nairobi and Addis are responsible for procurement and stores, housing and food services, international travel, legal and liaison services, security and a range of services connected to the physical plants including local transportation. Operating manuals are in place for most of these activities.

The Addis campus is something of a green oasis, highlighted by profusely flowering borders, courtesy of the wife of a former DG. Its facilities include 24 staff residences; 57

hostel rooms, a cafeteria and dining rooms, training rooms and auditoriums; a clinic; offices and laboratories. It is used as a training site both by ILRI and by CGIAR and other sister organizations, and is well suited—and especially well managed—for this purpose. Although it has been meticulously maintained over the years, some of the underlying infrastructure on the campus, such as laboratory roofing, may need replacement in the relatively short term. The Physical Plant Department in Addis also takes care of the research station at Debre Zeit and provides services to staff living off campus that are not readily available through the municipality. It has recently increased water storage capacity on the compound and, as a result of the 1996 installation of a 450 kw generator, can provide emergency electrical power when the local supply is disrupted.

The headquarters campus at Kabete, outside Nairobi, is equally attractive. The campus includes offices, labs, recreation and dining facilities, 19 hostel rooms and 28 housing units of varying sizes. All the facilities at this site have also been very well maintained but, again, because of the age of the infrastructure, some adjustments are now needed, specifically with respect to the water piping, part of the sewage system, and campus roads. New technology was recently installed to ensure the safe discharge of run-off from the filtration lagoons that, Management suggests, could be an example to small municipalities and businesses in Kenya.

ILRI is a partner of the United Nations Security System in both Ethiopia and Kenya. Security on the Addis campus is very competently managed by regular Institute employees. Externally, there is an issue of road safety and continuing concern over the relationship between Eritrea and Ethiopia. In Nairobi, a locally-recruited Chief Security Officer and ten ILRI staff officers manage a contracted guard force and, as noted, have brought about a significant reduction in the level of on-campus theft experienced in 1995 and 1996. The external situation in the city, where the crime rate has been increasing, is a much more serious problem. A number of staff have been victims, although, fortunately, none have sustained serious physical injury, and two Institute vehicles have been lost through hijacking. ILRI has taken a number of precautionary measures but still finds that the situation inhibits the Institute's ability to recruit international staff.

12.7 Cost-Effective Use of Physical Facilities

Over time ILRI has acquired a number of physical facilities and a considerable amount of equipment. As a result of the merging of the two institutes, ILRI inherited two major campuses. In addition, its stock of animals has grown in response to its research needs.

All evolving organizations face the challenge of adjustment so that their physical facilities and other assets match their needs. However, the decisions to be taken and the pattern for adjustment depend on a clear definition of mission and strategy for the organization as a whole and for the research programme in particular. These will lead to decisions for the purchase of new assets and for the disposal of some of the existing ones. Such decisions should be based on the real opportunity cost of selling versus the cost of maintenance, including losses in efficiency, and benefits accrued by current use.

The functions performed by an organization determine the need for specific physical facilities and equipment. In the case of an international agricultural research organization, its requirements depend on the functions of such facilities to support research for the provision

of international public goods as well as on the mode used to undertake each specific function. For example, if increased research is done in collaboration with NARS or other IARCs, the requirements will be different than if the research is done in a sole basis. Also, as the mandate, the priorities for research, and the structure of funding change, there will be a need to adjust the utilisation of physical facilities and equipment.

ILRI physical facilities can be grouped into two major categories: campuses and research stations, farms or ranches, each with their attendant offices, laboratories, barns, and housing. In addition, ILRI has acquired access to facilities at the campuses of the other IARCs, with whom it has joint programmes, i.e. IITA (Nigeria), ICRISAT (Niger and India), IRRI (Philippines), CIAT (Colombia), and CIP (Peru).

An important asset for ILRI is also the cattle and other animals held at the research stations and at the Kapiti Plains Estate ranch. Its value is far beyond market, as its primary purpose is producing animals for research.

The Institute's physical facilities include:

- ILRI-Kenya – a modern complex of facilities on a 70-hectare site at Kabete, on the outskirts of Nairobi. In addition to eight laboratories, the facilities include electron microscopy; radioisotope and irradiation units; breeding units for animals, tsetse flies and ticks; a secure animal facility; facilities for administrative, computer, biostatistical, training, graphics and public awareness work; conference rooms; a library, dining room, and visitors' hostel; recreational facilities; and staff housing.
- ILRI-Addis Ababa – an 30-hectare campus with laboratories; extensive forage genebank; offices for programme and administrative staff; library and information processing facilities; extensive training and meeting facilities, including hostels; computer and biostatistical facilities; editorial, writing and printing facilities; recreational and staff housing.
- The Forage Genebank on the Addis campus conserves more than 13,000 accessions of forages from almost 900 species belonging to over 200 genera.
- Kapiti Plains Estate Limited – a wholly owned subsidiary of ILRI, this 13,000 hectare ranch, 50 km south-east of Nairobi, comprises 1,200 Boran cows and followers, 40 dairy cows, a small herd of trypanotolerant N'Dama cattle, 400 Red Maasai ewes, and 400 Dorper ewes and followers.
- Debre Zeit – a 210 hectare research station about 50 km south-east of Addis Ababa in the Ethiopian highlands, with barns, laboratories, milk processing, seed processing and training facilities, workshops, nine offices, two staff houses, 12 hostel rooms, and a cafeteria. The station's animal population includes almost 400 head of cattle, about 100 sheep, and 75 goats.

The Panel has been asked to examine the use of ILRI's research infrastructure in the light of its efforts to position itself as the CGIAR global livestock research Centre. Particular attention was to be given in this context to the continued maintenance of two major ILRI campuses in Eastern Africa.

The Panel offers its position with regard to this important aspect below.

ILRI is the result of the integration of two autonomous CGIAR Centres, which, over a period of about 20 years, independently developed their programmatic agendas, and established physical structures at their respective principal sites.

In late 1994, the ILRI Board of Trustees decided to make the Nairobi facilities, developed by ILRAD, the headquarters of the unified institute and to continue using the Addis Ababa facilities, developed by ILCA, as a second principal site of the new institute.

Assuming rational use of the facilities in the independent Centres before the integration, the above Board decision implied the expectation that the unified Institute would operate at least at the aggregate funding level of the combined institutes before they were affected by the heavy resource decline in the early 90s, in order to continue using these facilities at the necessary level of efficiency.

The experience of the institute since its inception in January 1995 has shown, however, that total funding of the Institute has constantly fallen short of this expected and also TAC recommended level. By implication, therefore, costs related to the maintenance of the institute's facilities were constantly above desirable thresholds, and the infrastructure thus remained under-utilised.

ILRI was, in addition, challenged with (a) the expectation of programmatic integration of its livestock production (ILCA) and disease control (ILRAD) dimensions by exploiting apparent synergies – which requires core elements of these dimensions to be in frequent contact with each other at the same operational base, and (b) with the expansion of ILRI's mandate beyond Africa with concomitant resource requirements.

The Ethiopia based ILRI facilities have been particularly seriously affected by this development which has led to substantial under-utilisation of ILRI's Ethiopia-based infrastructure and resulted in high maintenance costs relative to the research programme supported by this infrastructure.

The Panel considers the continued maintenance of two large campuses for ILRI's research alone in East Africa as an untenable situation, which could seriously impair the Centre's further evolution into a vigorous research institution with a global livestock research mandate.

The Panel recognises, on the other hand, that Ethiopia, having the largest cattle population and second largest human population in Africa, with a great variety of agroecological, socio-cultural and socio-economic conditions, is a natural focal point for strategic international livestock research.

However, given the decision of the ILRI Board of Trustees to establish the ILRI headquarters at Nairobi, and given the global mandate of the institute, the Panel questions whether ILRI will be in a position to reassemble an Ethiopia-based research programme of a size commensurate with the size of the available infrastructure in Ethiopia.

While the Panel – on the basis of its critical analysis of ILRI's research programme since its inception – recommends termination and/or transfer of some of the field and

laboratory research currently undertaken at the Ethiopia principal site (see Chapters 6 and 7), it does not recommend closure of this site but submits the considerations below for the further utilisation of these facilities under ILRI's responsibility and within the ILRI – Government of Ethiopia host country agreement.

ILRI's Ethiopia facilities are a very well maintained, versatile complex of housing, office, laboratory, field and barn, conference, training, hostel and support components which lends itself ideally for use by members of the CGIAR network of International Agricultural Research Centres in their efforts to increase their research and training emphasis on Africa as per the recommendations of the CGIAR Systems Review. Similarly, non-CGIAR international agricultural research Centres, as well as other institutions mandated with research and research training may also take advantage of these facilities, which represent a most valuable CGIAR System asset.

To ensure implementation of the proposed restructuring and integration of ILRI's research programme, and to utilise cost-effectively the valuable research infrastructure, the Panel recommends the following action plan for achieving proper utilisation of ILRI's facilities in Ethiopia:

- i) in close consultation with the Government of Ethiopia, ILRI redoubles its efforts to accommodate international agricultural research and training oriented programmes on its Ethiopian premises; the conditions of such accommodation, which may also include technical and administrative support, are to be guided by the ILRI-GoE host country agreement and to be based on full cost-recovery,**
- ii) with respect to its own Ethiopia-based research programme, ILRI emphasise strategic research aspects, with international scope, in the context of restructuring ILRI's research programme, as recommended in the programme-related Chapters of this report,**
- iii) by the end of the year 2001 an external evaluation will establish progress in implementing this recommendation and propose further steps needed.**

The Panel assumes that the CGIAR will closely monitor and support this important process.

CHAPTER 13 - CONCLUSIONS AND FUTURE DIRECTIONS

ILRI Four Years after its Establishment

The integration of ILCA and ILRAD into a new institution with a global mandate on January 1st, 1995, was a reflection of structural adjustment discussions held in the CGIAR in the early 1990s. These discussions were intended to complement and, at the same time, to streamline the CGIAR System. While the discussions on the expansion of the System resulted in the successful integration of various International Research Centres into the CGIAR, ILRI remains the only Institute that is the result of the amalgamation of two previously independent CGIAR Centres.

This is the report of the first External Programme and Management Review of this Institute. The Panel has therefore addressed the question whether the objectives of seeking to capitalise on potential synergies and achieving economies in the CGIAR's global livestock research were achieved by this institutional integration.

In doing this, the Panel recognised that in any integration the idiosyncrasies of the units to be merged are very important factors affecting the success or failure of the resulting enterprise. In the case of ILRI, the CGIAR System could have hardly identified two centres which were more dissimilar in their research approaches and institutional cultures than ILCA and ILRAD. While ILRAD, over twenty years, was committed to an essentially basic biological research agenda in the area of animal diseases and their control, ILCA was carrying out a largely applied if not adaptive research programme in animal production. Apart from sharing the same geographical mandate area, there was little interaction between the two institutions, with the exception of the highly successful African trypanotolerance network for which both Centres shared responsibility. Given these drastic differences in institutional cultures and scientific approaches, the level of integration so far achieved is, in the Panel's view, commendable. Staff, Management and Board deserve applause for this achievement.

There is, obviously, some way to go, but the Panel wishes to make clear that it has, after careful assessment of the Institute, no doubt that the decision of the CGIAR to integrate the two Centres was correct, and that the Institute has responded positively to this decision. The Panel also believes that this integration has provided ILRI with the necessary conditions for positioning itself as a major contributor to the resolution of key research problems relating to the rapidly evolving and expanding animal agriculture in the tropics.

The contributions of ILRI and of its predecessors, ILCA and ILRAD, to livestock sciences and to the understanding of livestock production systems in the tropics are valuable assets in this endeavour.

The Institute now needs to address some aspects that require further strengthening. The Panel has commented on these in previous Chapters of this report and has identified areas where decisive action is required (vision, strategy, and priorities – Chapter 3; leadership

and organizational structure – Chapters 4 & 5; research focus and quality – Chapters 6 – 8, 11; partnerships – Chapters 9 & 10; and cost effectiveness – Chapter 12). The Summary and Recommendations Chapter gives an overview. The Panel was pleased to note the positive attitude taken by Management and staff to the EPMP process.

The Panel has noted that, since the establishment of ILRI, there has been some convergence of the ex-ILCA and ex-ILRAD components in that the livestock production parts of the programme (ex-ILCA) have made an effort to place themselves in a more strategic position (not least expressed in their contribution to scientific literature), while the disease control side (ex-ILRAD) has moved closer to an applied emphasis (e.g. vaccine development). The Panel believes that ILRI's donors should take favourable note of this important convergence.

The Panel is convinced that it is in the strategic, upstream research that ILRI will continue to have its comparative advantage. Therefore, the Institute is strongly encouraged to continue to protect these strategic areas of its programme, and to communicate them convincingly to the donor community and to national, regional and international partner institutions.

The Way Forward

The Panel has undertaken a thorough, analytical assessment of the Institute's programme and management and has endeavoured, on the basis of this analysis, to emphasise a strategic, forward-looking dimension in its deliberations. It has agreed on fourteen recommendations, each of which addresses important aspects of this strategic approach.

The Panel took as a point of departure a global perspective on animal agriculture in the tropical world (Chapter 1), and decided to use this perspective as a guiding framework for the review of ILRI's programme. Tropical animal agriculture is currently in a very dynamic process of evolution and expansion with unprecedented challenges and exciting opportunities for research and development.

In establishing ILRI and in equipping the Institute with a global mandate, the CGIAR has given itself a potentially powerful means for proactively addressing these challenges and opportunities in a variety of institutional alliances. The Panel strongly believes that the strategic animal disease, nutrition, animal production, policy, and natural resource management research agenda of the Institute, complemented by advanced information technology applied to tropical animal agriculture, can position the Institute at the core of the international livestock research agenda. The intention of the Panel in crafting its recommendations on programme and management was to support the efforts of the Institute to live up to the very high expectations with which it is faced. At the same time the Panel endeavoured to contribute to a renewed commitment and trust of ILRI's investors and stakeholders.

The Panel believes that ILRI has an enormous potential to contribute to human well-being in the tropical world. If the technical advances in core areas of its research (genomics, biotechnology, bioinformatics) continue as in the recent past, and if the Institute prepares itself to use productively the results of this dynamic global process, there is potential for very significant impact, particularly in the disease control area. The Panel believes that

its suggestions and recommendations will help to position the Institute correctly for achieving such impact.

In its analysis of ILRI's programme and management structures, processes and procedures, the Panel has identified key areas in which decisive action is needed.

- (a) A compelling vision of the Institute needs to be developed and used for gaining support among staff for enduring corporate values.
- (b) The Institute is strongly advised then to revisit its long-term strategy in the light of the rapidly changing external environment. In this context, the Panel expects ILRI to develop a position with regard to its role in research on monogastric animals. Similarly, a clear position on the implementation of ILRI's global mandate needs to be developed.
- (c) There is, in addition, an urgent need to improve processes by which priorities are set and implemented across the Institute, by which project and programme planning is then undertaken, and by which quality control of output is done.
- (d) Of particular importance is the more systematic effort to integrate research efforts across the Institute for which, in the Panel's view, the position of a Deputy Director General (Research) is one important prerequisite.

The Panel believes that, if the above actions are properly implemented, the areas of concern and the opportunities for building strength can be adequately addressed.

Areas of concern with respect to biological research relate to:

- slow progress, lack of focus, and unchecked feasibility of vaccine development efforts, inevitably associated with an erosion of the Institute's credibility in this research,
- unspecified position on delivery and future developments in diagnostics,
- downward trend in output and quality, except in disease resistance research,
- weaknesses in animal nutrition research in both quality and focus.

Biological research opportunities, on the other hand, relate to:

- enormous promise in research on disease resistance and tolerance, and genetic mapping,
- significant promise in immunology and molecular biology to exploit the fruits of genomics research,
- powerful options for the use of epidemiology, and
- ILRI's key role in generating, through its NARS linkages, the necessary data for enhanced efforts in the conservation of domestic animal genetic resources.

The Panel noted with interest the concept submitted by ILRI of maintaining 'platforms of essential capacity' as an attractive means of establishing core competencies and critical mass in essential disciplinary areas. This approach is particularly useful in the context of ILRI's attempts to address its global mandate. Examples of where ILRI is encouraged to retain such core expertise of high quality are in the areas of immunology, molecular biology and genomics/genetics, so that ILRI is placed in a position of comparative advantage to exploit the data from genome sequencing, mapping and bioinformatics.

For the production systems research, the Panel argues in the report that ILRI needs to focus more closely on market opportunities in line with the ongoing protein food revolution in the tropical world. In suggesting this important strategic shift, the Panel does not advocate a particular commodity focus for the Institute (e.g. dairy), but it urges ILRI to relate more closely its production systems and natural resource management research to livestock market opportunities. In undertaking this strategic shift and in refocusing its production systems research portfolio accordingly, the Institute will have, in the Panel's view, substantially enhanced its ability to contribute to food security, poverty alleviation in rural as well as urban communities, and resource conservation.

The Panel's recommendation to emphasise market-oriented livestock systems explicitly and systematically implies enhanced opportunities for the generation of impact at the farm family level through higher income, regardless of the livestock species or configuration of the production system.

The Panel is confident that ILRI, when strategically re-positioned as per the recommendations made, can – in strategic partnership with relevant research institutions - become a major force for generating the next food revolution in the tropical world. It strongly encourages the donor community to invest in this highly worthwhile endeavour.

PROGRAMME AND PROJECT AREAS

ILRI'S Research Programmes: Objectives, Projects and Activities

Programme	Projects	Activities, Sites, Staffing, Budget
<u>Biosciences Research</u> Objectives Reduce poverty through research partnerships to develop products that improve livestock health, nutrition and genetics in developing countries.	<ul style="list-style-type: none"> - Characterisation, conservation and use of animal genetic resources (project 1) - Development of disease-resistant livestock (project 2) - Molecular basis of pathogenesis and disease resistance (project 3) - Immunology and vaccine development (project 4) - Improving livestock productivity through development of sub-unit vaccines (project 5) - Development and application of diagnostic tools in disease control and surveillance (project 6) - Epidemiology and disease control (project 7) - Feed improvement for improving livestock productivity (project 8) - Rumen microbiology for feed utilisation enhancement (project 9) - Characterisation and conservation of forage genetic resources (project 10) 	<ul style="list-style-type: none"> - Development of vaccines and diagnostics for improved disease control - Identification and exploitation of disease-resistant breeds of indigenous livestock - Identification and utilisation of improved forages for improved ruminant nutrition - Development of improved technologies for determining constraints and delivery of control strategies Sites Nairobi (Kenya), Addis Ababa and Debre Zeit (Ethiopia), Pantacheru (India) and Los Banjos (Philippines). Staffing 46 internationally recruited staff. Budget \$12,907 million in 1999.
<u>Sustainable Production Systems Research</u> Objectives The overall objectives are to improve the livelihood of people in the tropics and sub-tropics through research and research partnerships on technologies that improve the productivity and sustainability of smallholder systems. The specific objectives are to: <ul style="list-style-type: none"> - Increase production, household income and human welfare through increasing crop and livestock productivity - Conserve and arrest degradation of natural resources - Assess combined impacts of technologies and policies on ecological changes and human welfare at varying spatial and temporal scales - Contribute to regional and global agricultural development agenda aimed at food security, poverty alleviation and environmental protection 	<ul style="list-style-type: none"> - Increasing returns to livestock research through systems analysis and impact assessment (project 11) - Policy analysis for improving productivity and sustainability of crop-livestock systems (project 12) - Improving productivity and sustainability of crop-livestock systems in: <ul style="list-style-type: none"> - the highlands of SSA and Asia, sub-humid and highlands of LAC and arid zones of WANA (project 13) - subhumid SSA and Asia (project 14) - semi-arid zones of SSA and Asia (project 15) - fragile environments in LAC (project 16) - WANA (project 17) - Improving livestock productivity under disease risk (project 18) - Improving productivity and sustainability of market-oriented smallholder dairy systems (project 19) - System-wide Livestock Programme (SLP) 	<ul style="list-style-type: none"> - Development of livestock-related technologies and policies, based on agroecological knowledge and stakeholders' participation, to overcome constraints to crop-livestock systems improvements - Development of integrated NRM strategies to arrest degradation of natural resources - Assessment of the impact of technologies, policies and NRM strategies on food security, poverty eradication, human health and nutrition and environmental protection - Development of decision support systems for improvement of crop-livestock systems and NRM at different scales: farm, watershed, ecoregional - Transregional analysis of livestock based systems. Sites Addis Ababa (Ethiopia), Nairobi (Kenya), Niamey (Niger), Ibadan (Nigeria), Bobo Dioulasso (Burkina Faso), Patencheru (India), Los Banos (Philippines), Lima (Peru) and Cali (Colombia). Staffing 36 internationally recruited staff. Budget US\$ 11,378 million in 1999.

Programme	Projects	Activities, Sites, Staffing, Budget
<p><u>Strengthening Partnerships with NARS</u></p> <p>Objectives To strengthen the capacity of NARS to develop and implement research leading to sustainable increases in the productivity of animal agricultural systems; and to enter into effective partnerships with ILRI.</p>	<p>Capacity development for strengthening NARS (project 20)</p>	<ul style="list-style-type: none"> - Strengthening the capacity of staff within the national institutions to conduct and manage livestock research through the delivery of training, and through the provision of training resources to strengthen the capacity of NARS to design and deliver their own training - Providing access to the re-packaged information and knowledge generated by ILRI - Providing access to information resources (ILRI's and external resources), and strengthening the capacity of NARS to use information to support their scientists - Using networking as a mechanism to promote collaborative research <p>Sites All ILRI sites and with key NARS.</p> <p>Staffing 10 internationally recruited staff.</p> <p>Budget \$3,776 million in 1999.</p>

ILRI PROJECTS: Objectives, Activities, Staff and Budget

ILRI Projects	Objectives	Activities	Scientist Years* (incl. VS)	Budget in 1999 (US\$'000) ¹
1. Characterisation, conservation and use of animal genetic resources	To characterise indigenous livestock breeds, estimate the extent and rate of loss of diversity, contribute to their use and conservation and make them available for research and animal improvement programmes	Molecular genetic characterization Identification of unique traits and populations and data collection Develop strategies for conservation	1.5	612
2. Development of disease-resistant livestock	To develop and test genetic markers of trypanosomosis resistance in cattle and helminthosis resistance in sheep and to design breeding strategies that incorporate their use	Advanced genomics research for genetic markers of trypanosomosis and helminthosis resistance Design breeding strategies Characterisation of indigenous sheep and goat breeds in Africa and Southeast Asia	7.5 (incl. 2 VS)	1,977
3. Molecular basis of pathogenesis and disease resistance	To identify haemoparasitic components that will constitute anti-parasite and anti-disease vaccines for implementation in integrated control systems	Identification of haemoparasitic components for anti-parasite and anti-disease vaccines Research on mechanisms of host-parasite and host-vector interactions Identification and exploitation of molecular mechanisms of disease resistance in African wildlife	2.5	1,259
4. Immunology and vaccine development	To identify protective immune mechanisms and the antigens that provoke them, and definition of the inductive requirements of appropriate immune responses	Identification of protective antigens of haemoparasites and antigen delivery Characterize host immune responses to haemoparasite antigens Identify reagents and assays for evaluating the efficacy of vaccines	9.0 (incl. 2 VS)	1,933
5. Improving livestock productivity through development of sub-unit vaccines	To identify and evaluate protective antigens as candidate vaccines that can sustainably and cost-effectively be deployed in the field within different production systems	Identify and evaluate protective antigens as candidate vaccines	6.0 (incl. 1 VS)	1,678
6. Development and application of diagnostic tools in disease control and surveillance	To develop serological and molecular diagnostic tools for identifying and characterising vector-borne diseases	Development of standardised and validated diagnostic and characterisation tools for detecting vector-borne pathogens	9.0 (incl. 3 VS)	1,921
7. Epidemiology and disease control	To identify issues that constrain use of disease control technologies and develop strategies for integrated use of technologies	Identify major issues constraining use of disease control technologies Development of strategies for integrated use of technologies and decision support systems	6.0	1,172
8. Feed utilization improvement for	To develop better methods for assessing the nutritive value of tropical feeds and the nutrient	Identification of feed quality traits for selection and genetic enhancement of crops with better-quality residues	3.0	1,162

¹ The budget includes programme support and all the indirect costs allocated pro-rata.

ILRI Projects	Objectives	Activities	Scientist Years* (incl. VS)	Budget in 1999 (US\$'000) ¹
enhancing livestock productivity	status of ruminants, to increase animal productivity through improved feed utilisation and to determine the relationships between feeds and productivity	Improving feed efficiency through modified rumen ecosystems and kinetics of fibre digestion Information on effect of defaunation on ruminant productivity		
9. Rumen microbiology for feed utilisation enhancement	To characterize rumen microorganisms for their effects on rumen fermentation and detoxification of anti-nutritional compounds and to promote the use of better-adapted strains for increasing the nutritional status of tropical livestock.	Characterization of rumen micro-organisms for improved ability to utilize fibrous feeds and detoxify anti-nutritional factors Identification of indigenous plants with anti-protozoal activity Identification of the anti-protozoal agent in <i>Sesbania sesban</i> and <i>Enterocloium cyclocarpum</i>	1.0	317
10. Conservation and characterisation of forage genetic resources	To conserve and characterise forage biodiversity and to ensure its use in the development of livestock feeds	Conservation of forage germplasm Characterization of morphological, molecular and phytochemical traits of key species Distribution of disease-free germplasm for forage research and development	3.0	875
11. Increasing returns to livestock research through systems analysis and impact assessment	Through the use of ex-ante impact assessment, to contribute 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	Development of methods and models for ex-ante and ex-post socio-economic, environmental and biophysical impact assessment Compilation of standardised livestock and natural resource management databases Characterisation of global livestock production systems and the identification of criteria by which to evaluate research Development of decision support systems for technology delivery and use	7.0 (inc. 1 VS)	1,406
12. Policy analysis for improving productivity and sustainability of crop-livestock systems	To quantify the impact of livestock policy and institutional reform options on technology uptake for livestock.	Collection of information on how policies, institutions and farm-level factors interact to influence the adoption of new technologies, the production, marketing, consumption and trade of livestock and livestock products, the sustainable delivery of livestock services and the sustainable use of the natural resource base Quantification of the impact of livestock policy and institutional reform options on technology uptake for livestock. Development of strategies to support smallholder participation in dairy development	7.5	1,532
13. Improving crop-livestock systems and sustainability in the highlands of SSA and Asia	To develop biophysical, social and economic interventions that strengthen the contributions of livestock to increased farm productivity while protecting the environment	Development of conceptual frameworks, methodologies and tools for natural resource management and nutrient cycling Development of models of the impact of livestock on the environment	5.25 (incl. 1 VS)	1,127

ILRI Projects	Objectives	Activities	Scientist Years* (incl. VS)	Budget in 1999 (US\$'000) ¹
14. Improving productivity and sustainability in crop-livestock systems of sub-humid Asia and SSA	To develop technical and socio-economic interventions that increase the contributions of livestock to productivity and sustainability of crop-livestock systems in the subhumid ecozone	Development of conceptual frameworks, methodologies and tools for nutrient cycling and natural resource management Development of models and technological options for increasing feed from crop-based systems Identification and description of farming systems in rainfed areas in Southeast Asia Ex-ante impact assessments of technologies for improving livestock productivity and natural resources management	4.5	1,107
15. Improving productivity and sustainability of crop-livestock systems in semi-arid SSA and Asia	To develop livestock-related technologies and determine policy options that would improve the productivity of integrated crop-livestock systems in semi-arid SSA and Asia	Development of technological options to increase output through improved feeding systems and better use of manure and other soil amendments Development of technological options to increase production and prevent degradation of range and fallow lands Policy options and institutional arrangements to promote technology adoption and improved management of grazing resources	3.0	1,011
16. Improving productivity and sustainability of crop-livestock systems in fragile environments in LAC	To strengthen livestock-related research by regional consortia addressing biotechnical and policy constraints limiting smallholder agricultural productivity and the sustainable management of natural resources in fragile ecosystems	Systems analyses and <i>ex ante</i> impact assessment of interventions on production, farm income and the resource base in bench mark sites Validation of technologies in a participatory manner on-farm by a consortia of research and development institutions	1.0	362
17. Improving productivity and sustainability of crop-livestock systems in WANA	To identify and research biotechnical constraints affecting the provision of ruminant feed, nutrient cycling and natural resource management, characterise local breeds of small ruminants, identify disease constraints and contribute to the development of regional research capacity on livestock policy analysis	Identification of biotechnical constraints affecting the provision of ruminant feed, nutrient cycling and natural resource management Characterisation of local breeds of small ruminants Identification of disease constraints Development of regional research capacity on livestock policy analysis	<0.5	197
18. Improving livestock productivity under disease risk	To promote wider and better use of disease resistant livestock; assess feasibility, adoption, impact and sustainability of alternative control strategies; develop strategies for using or selecting livestock with enhanced resistance to tropical diseases; and develop decision-support tools for targeting trypanosomosis control interventions	Assessing feasibility, adoption, impact and sustainability of alternative control strategies Developing strategies for using or selecting livestock with enhanced resistance to tropical diseases Developing decision-support tools for targeting trypanosomosis control interventions	2.25	1,467
19. Improving productivity and sustainability of	Through a production-to-consumption systems approach, to understand the evolution of dairy systems and identify constraints to, and	Identification of biological and policy constraints to, and opportunities for, improving smallholder dairy systems Developing and testing technologies, tools and methods	5.0	2,116

ILRI Projects	Objectives	Activities	Scientist Years* (incl. VS)	Budget in 1999 (US\$'000) ¹
smallholder dairy systems	opportunities for, improving smallholder dairy systems by developing policies that foster conducive operational environments and developing and testing technologies, tools and methods that can be applied widely			
20. Capacity development for strengthening NARS	To strengthen the research capacity of those components of national agricultural research systems that seek to improve the productivity of livestock and crop-livestock systems. To provide mechanisms and systems to allow ILRI to function as a knowledge broker for livestock research and development.	To co-ordinate and back-stop NARS-ILRI collaborative research networks, and to synthesise the results coming from network research. To provide targeted training for NARS scientists and to support ILRI's research partnerships in NARS To use ILRI information and knowledge to develop training resources in key research areas to strengthen the capacity of NARS to train and educate their own staff. To establish Internet-based information systems to repackage and widely distribute ILRI knowledge and information services.	10.0	3,778
System-wide Livestock Programme	To strengthen the capacity of national partners for livestock research through training, information services and collaborative research networks	Developing technologies for improving supply, quality and quantity of livestock feeds Matching livestock nutritional requirements and local feed resources through improved feeding strategies Identification of technological options and policies for sustainable management of natural resources in crop-livestock systems.	1.0	1,053
Total			95.5²	28,061.3

² Scientist Years include 10 Visiting Scientists (VS) Years.

APPENDIX II

COMPOSITION OF THE PANEL AND BIOGRAPHICAL INFORMATION

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Name: JUTZI, Samuel C. (Switzerland)

Position: Senior Professor, Faculty of Agriculture, International Rural Development and Environmental Sciences; Head, Department for Tropical and Subtropical Field Crops, University of Kassel, Federal Republic of Germany.

Expertise: Agricultural Economics, Forage Agronomy, International Agricultural Research and Development.

Education: Dipl. Ing. Agr., Plant Sciences and Agricultural Economics, Swiss Federal Institute of Technology (ETH), Zurich, Switzerland; Dr. Sc. Techn. (with distinction), Swiss Federal Institute of Technology (ETH), Zurich, Switzerland.

Experience: Agricultural Economist, Swiss Farmers' Union (Highland Farmers' Section), Brugg, Switzerland; Agronomist (forage research and herbage seed production), Faculty of Agronomy, University of Cochabamba, Bolivia; Agronomist, Cerrado Research Centre (CPAC) Empresa Brasileira de Pesquisa Agropecuaria (EMBRAPA), Brasilia; currently, Senior Professor, Faculty of Agriculture, International Rural Development and Environmental Sciences, and Head, Department for Tropical and Subtropical Field Crops, University of Kassel. 1995-96, Dean of the Faculty of Agriculture, International Rural Development and Environmental Sciences. Deputy Director of the Centre for International Agriculture, and a member of the Institute of Crop Science.

Name: BLAKE , Robert W. (USA)

Position: Professor of Animal Science, Animal Breeding, and International Agriculture and Rural Development (IARD), Cornell University.

Expertise: Animal Breeding, Livestock Components of Agricultural Systems, matching genetic potentials to environmental constraints in various agroecozones, economic evaluation and decision-making.

Education: B.S., University of Minnesota; Ph.D. and MTID, North Carolina State University.

Experience: US Peace Corps, Peru; 1977-86: faculty member, Texas A&M University; 1986-present, Professor of Animal Science, Animal Breeding, and International Agriculture and Rural Development, Cornell University. Director of Graduate Studies for IARD, member of Program Committee for the Cornell International Institute for Food, Agriculture, and Development. 1992-93: Sabbatical leave at CIAT. Visiting scientist, consultant or evaluator for a number of organizations.

Name: FAYLON, Patricio S. (The Philippines)

Position: Director, Livestock Research Division, Philippine Council for Agricultural and Resources Research and Development (PCARRD), The Philippines.

Expertise: Livestock Production/Nutrition

Education: B. S. Agriculture, Swine Production/Agricultural Business Management, University of the Philippines College of Agriculture, 1972; M.S. , Ruminant Nutrition/Production Economics, University of Illinois, USA, 1976; PhD, Ruminant Nutrition and Physiology/Meat Processing/Forage and Pasture, University of the Philippines at Los Banos (UPLB), 1981.

Experience: 1984-85, Acting Director, Livestock Research Department, PCARRD; 1982-84, Assistant Director and Officer-in-Charge, International Projects Department, PCARRD; 1986-87, National Team Leader, Beef and Chevron Commodities R&D Team, PCARRD;; 1990-92, National Professional Project Officer, Seconded from PCARRD to the Food and Agriculture Organization (FAO); 1986-88, Visiting Assistant Professor, and

Visiting Associate Professor, UPLB; 1992-93, Acting Deputy Executive Director for R&D, PCARRD; 1993-94, Technical Consultant, Pioneer Development Foundation for Asia and the Pacific, Inc.; 1985 to date, Director, Livestock Research Division, PCARRD.

Name: JOSHI, Joan H. (USA)

Position: Independent Consultant.

Expertise: Administration and General Management.

Education: A.B. Political Science, Cornell University (1954); Economics and Political Science, London School of Economics (1953); General Management Course, American Management Association (1975); Financial Management Course, Columbia University School of Business (1978).

Experience: 1954-57: held administrative positions primarily in educational and educational exchange institutions; 1968-91: served in varied positions with the Institute of International Education, including Manager, Study Abroad Programs (1968-75) and Vice President, Educational Programmes (1975-81); 1982-83: Director of Administration, ICARDA; 1983-present: as independent consultant: conducted recruitment campaigns and carried out management studies relative to organizational structure, administrative procedures, personnel policies, gender equity and board of trustees structure and operations for CGIAR Centres and Secretariat, TAC and Council for International Exchange of Scholars among others; also managed USAID grants to private voluntary organizations supporting public education programmes relating to international development. Member, External Review Panels of IITA (1984), CIMMYT (1989), CIAT (1989), IIMI (1990), ICLARM (1995), ICRAF (1998) and the TAC Secretariat (1988); consultant to Panels reviewing CIP (1995) and CIAT (1995). Member, Board of Trustees, ICLARM.

Name: POMAREDA, Carlos (Peru)

Position: Executive President, Servicios Internacionales para el Desarrollo Empresarial, General Manager, Corporacion Ganadera "Los Laureles".

Expertise: Technical, Economic, Financial, Managerial and Organizational Aspects of Tropical Agriculture

Education: Agricultural Engineer, Universidad Agraria "La Molina"; MSc. Agricultural Economics, North Carolina State University; PhD, Agricultural Economics, Texas Tech University.

Experience: 1969-70, Field Technician, Univ. Agraria 'La Molina/CENDRET; 1972-74, Assistant in project, Agricultural Trade Barriers between Mexico and EEUU, North Carolina State University; 1974-76, Assistant, Agricultural Price Policy in East Africa, The World Bank; 1977-79, Chief, 'Agriculture and Integration en Centroamerica', SIECA; 1979-83, Researcher, 'Agriculture Insurance Project', IICA; 1984-86, Co-Leader, National Program of Agroecoeconomics, Peru, INIPA; 1987-1993, Director, Program of Agricultural Policy and Planning, IICA; 1994-98, Executive President, Servicios Internacionales para el Desarrollo Empresarial, General Manager, Corporacion Ganadera "Los Laureles". Consultant to The World Bank, BID, PNUD, USAID, FIDA and FAO in agricultural policy, international trade, project analysis, institutional development, financing and strategies for agriculture. Consultant to private enterprises, producer associations and public institutions in several countries of Latin America and the Caribbean. Leadership: President (founder), Asociacion Peruana de Economia Agricola (APEA), 1993-96; President, Asociacion Latinoamericana y del Caribe de Economia Agricola (ALACEA). Recognition: Award (1981 and 1985),

Asociacion Latinoamericana de Instituciones Financieras de Desarrollo (ALIDE) for the best technical work in the field of Agricultural Finance.

Name: SETSHWAELO, Louise L. (Botswana)

Position: Advisor, SADC/USAID Natural Resources Management Project, Botswana

Expertise: Tropical Animal Production, Beef Cattle Breeding and Genetics, Agricultural Research Management, Training, Curriculum Development.

Education: PhD, Animal Breeding and Genetics, University of Nebraska; MSc., Tropical Animal Health and Production, University of Edinburgh

Experience: Research Scientist and Manager (Beef cattle breeding and genetics, breed development; overseeing national livestock and range research program), Department of Agricultural Research, Botswana; Managing a SADC project in Tanzania on training in agricultural research management for senior and middle level research managers in the SADC region; Currently, Advisor, SADC/USAID Natural Resources Management Project, Botswana. Served on several committees including: US National Academy of Sciences Sub-Committee for Managing Global Livestock Genetic Resources, and the Permanent International Committee for the World Congress Applied to Livestock Production, 1990-1998.

Name: TAIT, Andrew (UK)

Position: Professor of Veterinary Parasitology, and Director of the Wellcome Unit of Molecular Parasitology, University of Glasgow.

Expertise: Biochemical Genetics; Genetics and specialisation of African trypanosomes; Molecular Parasitology; *Theileria annulata*.

Education: BSc, Biochemistry, University of Edinburgh; PhD, Genetics, University of Edinburgh

Experience: Postdoctoral work, University of Edinburgh, University of Colorado; 1987, with Professor D. Barry and with support from the Wellcome Trust, set up the Wellcome Unit of Molecular Parasitology in Glasgow; Currently, Professor of Veterinary Parasitology and Director of the Wellcome Unit of Molecular Parasitology, University of Glasgow. External offices: Chairman of the Animal Health Advisors, Merck; Member of the Governing Board of the Institute of Animal Health; Member of the Wellcome Trust Infection and Biodiversity Panels, and Member of the Editorial Boards of *Parasite Immunology* and *Experimental Parasitology*. Past offices: Chairman, WHO CHEMAF and IMMAF Steering Committee; EU Tropical Agriculture Evaluation Panels; Member of Visiting Group to the Institute of Animal Health and Member of MRC Fellowship, studentship and grant committees.

Name: VO-TONG, Xuan (Vietnam)

Position: Professor of Agronomy; Vice Rector, University of Cantho, Director, Mekong Delta Farming Systems Research and Development Centre

Expertise: Tropical Rice Production, Farming Systems, Management of Hydromorphic and Acid Sulfate Soils.

Education: B. Sc., Agricultural Chemistry, University of the Philippines (1966); M.Sc., Agricultural Chemistry, University of the Philippines (1969); D. Agr. in Crop Science, Kyushu University, Japan.

Experience: Research Fellow, International Rice Research Institute (1969-71); chairman, Dept. of Bio-Agronomy, University of Cantho, Vietnam (1971-75); Project Leader, Mekong Committee-USAID project on 'Management of Heavy Delta Clay for Multiple Cropping (1973-74); Chairman, Dept. of Agronomy, University of Cantho (1975-78); Asst. Dean of Agriculture, University of Cantho (1978-81); Vice Rector, University of Cantho (1982 to date); Project Leader, Management of Acid Sulphate Soils of the Mekong Delta (1980-92); Visiting Scholar, Harvard Institute of International Development (1990, 1991); numerous international consulting missions in Vietnam. Numerous awards and honours in Vietnam – Council of State Awards (4); Vietnam State Workers' Union Awards (Certificate of Invention, 1981, 1985); Certificates of Outstanding Scientific Achievement – Prime Minister (1980), Ministry of Agriculture (1986), People's Committee of Haugiang province (1978-1988); Outstanding Alumnus, University of the Philippines College of Agriculture Alumni Association (1990); Ramon Magsaysay Award for Government Service (1990). Author or co-author of four books on tropical rice production and two books on agriculture in the Mekong Delta, including a four-volume set on Soils, Food Crops, Industrial Crops, Aquaculture, Animal Husbandry, and Agricultural Mechanisation.

**TERMS OF REFERENCE
FOR EXTERNAL PROGRAMME AND MANAGEMENT REVIEWS
OF CGIAR CENTRES**

BACKGROUND

Context

The Consultative Group on International Agricultural Research (CGIAR) is an informal association of over 50 members that supports a network of 16 international research centres in agriculture, forestry and fisheries. The CGIAR aims, through its support to the Centres, to contribute to promoting sustainable agriculture for food security in developing countries. Because the Centres constitute the core of the CGIAR, the effectiveness of each Centre is crucial to the continued success of the CGIAR (as a System).

Each Centre is an autonomous institution operating within the mandate assigned to it by the CGIAR, and is governed by a legally constituted Board that has full fiduciary responsibility for managing the Centre. To ensure accountability in an essentially decentralized system, each Centre is expected to be responsive to the CGIAR, which provides financial support for its work.

The CGIAR has established a tradition of External Programme and Management Reviews (EPMRs) to provide a mechanism of transparency and accountability to the Members and other stakeholders of the CGIAR System. EPMRs are the joint responsibility of TAC and the CGIAR Secretariat, and are conducted for each Centre approximately every five years. As each Centre is autonomous, EPMRs provide a measure of central oversight and serve as an essential component of the CGIAR's accountability system.

Integrated System of Reviews of Each Centre

Besides the EPMRs, Centre Commissioned External Reviews (CCERs) are undertaken at each Centre. These CCERs are commissioned by the Centre Boards to periodically assess the quality and effectiveness of particular aspects of a Centre's work. The terms of reference (ToRs) for each CCER are determined by the Centre, based on broad principles endorsed by the CGIAR at ICW95 (ref. document entitled *Improving the Quality and Consistency of CGIAR's External Centre Reviews*, dated October 24, 1995).

EPMRs complement the CCERs by providing a CGIAR-commissioned and comprehensive external assessment of the Centre's program and management, especially its future directions and the quality and relevance of its research. The ToRs for the EPMRs (which update the "standard ToRs" endorsed by the CGIAR at MTM95) are provided below. Guidelines for undertaking the reviews are issued separately.

TERMS OF REFERENCE

Objectives and Scope

EPMRs seek to inform CGIAR members that their investment is sound, or recommend measures to make it so. Members of the CGIAR and other stakeholders can be informed whether the Centre is doing its work effectively and efficiently. EPMRs are both retrospective and prospective; and help ensure the Centres' excellence, relevance and continued viability, and the CGIAR System's coherence. Each review is expected to be strategic in orientation and as comprehensive as the situation warrants.

The broad objectives of EPMRs are to: a) provide CGIAR members with an independent and rigorous assessment of the institutional health and contribution of a Centre they are supporting; and b) to provide the Centre and its collaborators with assessment information that complements or validates their own evaluation efforts, including the CCERs.

The EPMR panel is specifically charged to assess the following:

- a) The Centre's mission, strategy and priorities in the context of the CGIAR's priorities and strategies;
- b) The quality and relevance of the science undertaken, including the effectiveness and potential impact of the Centre's completed and ongoing research;
- c) The effectiveness and efficiency of management, including the mechanisms and processes for ensuring quality; and
- d) The accomplishments and impact of the Centre's research and related activities.

The topics expected to be covered by the EPMRs are listed below.

TOPICS TO BE COVERED

A. Mission, Strategy and Priorities

- The continuing appropriateness of the Centre's mission in light of important changes in the Centre and its external environment since the previous external review.
- The policies, strategies, and priorities of the Centre, their coherence with the CGIAR's goals (of poverty alleviation, natural resources management, and sustainable food security), and relevance to beneficiaries, especially rural women.
- The appropriateness of the roles of relevant partners in the formulation and implementation of the Centre's strategy and priorities, considering alternative sources of supply and the benefits of partnerships with others.

B. Quality and Relevance

- The quality and relevance of the science practised at the Centre.
- The effectiveness of the Centre's processes for planning, priority setting, quality management (e.g., CCERs, peer reviews and other quality and relevance assurance mechanisms), and impact assessment.

C. Effectiveness and Efficiency of Management

- The performance of the Centre's Board in governing the Centre, the effectiveness of leadership throughout the Centre, and the suitability of the organization's culture to its mission.
- The adequacy of the Centre's organizational structure and the mechanisms in place to manage, coordinate and ensure the excellence of the research programs and related activities.
- The adequacy of resources (financial, human, physical and information) available and the effectiveness and efficiency of their management.
- The effectiveness of the Centre's relationships with relevant research partners and other stakeholders of the CGIAR System.

D. Accomplishments and Impact

- Recent achievements of the Centre in research and other areas.
- The effectiveness of the Centre's programs in terms of their impact and contribution to the achievement of the mission and goals of the CGIAR.

DOCUMENTS PROVIDED TO THE REVIEW PANEL

A. Documents Provided by the TAC and CGIAR Secretariats

1. Review Processes in the CGIAR, 1998.
2. CGIAR Priorities and Strategies for Resource Allocation During 1998-2000.
3. Report of the Third External Programme and Management Review of the International Laboratory for Research on Animal Diseases (ILRAD).
4. Report of the Third External Programme and Management Review of the International Livestock Centre for Africa (ILCA).
5. Medium Term Resource Allocation 1998-2000: Centre Proposals and TAC Recommendations.

To All Panel Members:

6. Lucerne Declaration and Action Programme (February 9-10, 1995 – 2 Vols.).
7. Most recent CGIAR Annual Report.
8. Most recent CGIAR Brochure and Directory.
9. (a) Financial Requirements of the 1998 CGIAR Research Agenda. (Agenda Item 8, Doc. No. MTM/97/14, May 6, 1997);
(b) Financial Requirements of the 1997 CGIAR Research Agenda (Doc. No. MTM/96/10, April 26, 1996).
10. Organization and Management of the CGIAR System: A Review, 1993. (S. Ozgediz, Public Administration and Development, Vol. 13, pp. 217-231; copyright 1993 by John Wiley & Sons, Ltd.).
11. Reference Guides for CGIAR International Agricultural Research Centres and their Boards of Trustees, August 1997.

To Relevant Panel Members:

12. Governance and Management of the CGIAR Centres, 1991. (S. Ozgediz, Study Paper No. 27, copyright 1991, first printing October 1991).
13. Most recent volume of the CGIAR Board of Trustees Directory.

14. Some Thoughts Toward Ensuring the Successful Performance of Boards in the CGIAR System, 1987. (John L. Dillon, August 1987).
15. CGIAR 1995 Financial Report (August 1987).
16. Committees and Units of the CGIAR: Roles, Responsibilities, and Procedures (April 3, 1996).
17. Most recent CGIAR financial guidelines and manuals relating to:
 - (a) Financial Management Guidelines, Series No. 1 (January 1988);
 - (b) Accounting Policies and Reporting Practices Manual (October 1993);
 - (c) Financial Guidelines – Audit Manual (July 7, 1995).
18. CGIAR Research Agenda: 1999-2001 Medium Term Plans (MTPs).

GLOSSARY OF ACRONYMS

ADD	Agricultural Development Department (Ethiopia)
AEZ	agro-ecological zone
AFNETA	Alley Farming Network for Africa
AFRNET	African Feed Research Network
Ag-ELISA	Antigen-trapping immunosorbent assay
AIRIC	Ethiopian Agricultural Implements Research and Inspection Centre
ALPAN	African Livestock Policy Analysis Network
AGRHYMET	Centre Régionale de Formation et d'Application en Agrométéorologie et Hydrologie Operationelle
AUA	Alemaya University of Agriculture (Ethiopia)
CABI	Commonwealth Agricultural Bureaux International
CD-ROM	Compact Disc - Read Only Memory
CBPP	contagious bovine pleuropneumonia
CIRAD	Centre de Coopération Internationale en Recherche Agronomique pour le Développement
CIRDES	Centre International pour la Recherche et le Développement de l'Elevage dans les Zones Sub-humides (new name for CRTA)
CIAT	Centro Internacional de Agricultura Tropical
CGIAR	Consultative Group on International Agricultural Research
CIMMYT	Centro Internacional de Mejoramiento de Maiz y Trigo
CIP	Centro Internacional de la Papa
CRTA	Centre de Recherches sur les Trypanosomoses Animales
CSIRO	Commonwealth Scientific and Industrial Research Organization
DA	Director of Administration
DDG	Deputy Director General
DG	Director General
DNA	Deoxyribonucleic acid
EAVRO	East African Veterinary Research Organization
EC	European Community
ECF	East Coast Fever
ELISA	Enzyme-linked immunosorbent assay
EMR	External Management Review
EPR	External Programme Review
EPRDF	Ethiopian People's Revolutionary Democratic Front
FAO	Food and Agriculture Organization of the United Nations
FC	Financial Controller
GIS	Geographic Information System
HOPs	Heads of Programme

HQ	headquarters
HSP	heat shock protein
IAEA	International Atomic Energy Agency
IARCs	International Agricultural Research Centres
IBAR	Inter-African Bureau for Animal Resources
IAR	Institute of Agricultural Research (Ethiopia)
IBSRAM	International Board for Soils Research and Management
IBPGR	International Board for Plant Genetic Resources
ICARDA	International Centre for Agricultural Research in the Dry Areas
ICIPE	International Centre for Insect Physiology and Ecology
ICRAF	International Council for Research on Agroforestry
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IDRC	International Development Research Centre
IFPRI	International Food Policy Research Institute
IEMVT	Institut d'Elevage et de Médecine Vétérinaire des Pays Tropicaux
IFDC	International Fertilizer Development Center
IER	Institut d'Economie Rurale (Mali)
IITA	International Institute of Tropical Agriculture
ILCA	International Livestock Centre for Africa
ILRAD	International Laboratory for Research on Animal Diseases
INRAN	Institut National de Recherches Agronomiques du Niger
IPO	Information and Planning Officer
ISC	ICRISAT Sahelian Centre
ITC	International Trypanotolerance Centre
ITM	infection and treatment method
JVP	Joint Vertisol Project
KARI	Kenya Agricultural Research Institute
KETRI	Kenya Trypanosomiasis Research Institute
LGP	length of growing period
MAbs	monoclonal bodies
MHC	major histocompatibility complex
MPT	multi-purpose tree
MTP	Medium-Term Plan
NARS	National Agricultural Research System
NGO	Non-Government Organization
NLPD	National Livestock Projects Division
OAU	Organization of African Unity
ODA	International Development Agency
PALs	Programme Area Leaders
PCR	polymerase chain reaction
PROLS	Project Leaders
QQR	Quinquennial Review

RAPD	Random Amplified Polymorphic DNA
RRG	Research Review Group
SACCAR	Southern African Centre for Cooperation in Agricultural Research
SSA	sub-Saharan Africa
TAC	Technical Advisory Committee of the CGIAR
TRLU	tropical ruminant livestock unit
TZ	thermal zone
UK	United Kingdom
UNEP	United Nations Environment Programme
USA	United States of America
VSG	variable surface glycoprotein
WAD	West African Dwarf
WANA	West Asia and North Africa
WHO	World Health Organization

