Centre-Commissioned External Review of ILRI's Biometrics, Data Management and Research Support Capacity

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Executive Summary

A review of ILRI's biometrics, data management and research support capability was carried out from 4 to 8 October 2004. It was preceded by a survey of ILRI staff and by a review of the biometric content of a sample of 6 ILRI projects.

The Biometrics Unit currently has five staff, of which one is international. All except one are in Nairobi.

The internal survey was in September 2004 and there were 108 responses (60% response rate) from all ILRI's locations. ILRI staff were very positive about the current contribution of the biometrics unit. Their suggestions for improvements were that it should, become proactive, broaden its skill base, have more staff and become closely involved in more projects.

The review of the biometric component of current ILRI projects was to provide inputs to the main review, and to assess how, if necessary, ILRI could improve the statistical inputs in future projects, to ensure the highest quality of research.

The review found that striving for high quality needed improvements at all stages of the research process, from study design, through information management and in analysis. A central issue is the need for improved information management procedures, support, and practices.

The review team found the biometrics unit staff to be enthusiastic and motivated. They recommend that the charging policy of the unit be reviewed. Full cost recovery is not possible and the role of the Unit in supporting the highest quality of research will be helped if small inputs to projects and agreed proactive activities are funded from central overheads.

They recommend that the unit should continue, and work across all ILRI's five themes. It needs strengthening, both to support improved data management practices, and for broader and higher-level statistical inputs. Closer involvement with more projects should result in much of the extra costs being part of the individual project budgets, at least after initial possible "pump-priming" inputs.

The new biosciences centre provides a particular opportunity, within which biometric inputs should be recognised as key.

The unit can draw on, and should coordinate inputs from others with statistical expertise, both internally and externally. Consideration should be given to close working or integration of the Biometric Unit with the new service unit that is to support GIS, and possibly also spatial statistics.

The unit should strive to strengthen its collaboration with other CGIAR centres, particularly with WAC, with whom it already works.

There is a large potential role for the Unit in capacity development, both for work within ILRI and with NARS partners. The review team supports the initiative on training incoming students in collaboration with WAC. Other capacity development could be through ILRI projects and through the networks, such as ASARECA. Such support should be fully funded, and should often be in collaboration with other centres. The Unit currently has a funded project to build a training resource. The unit should be similarly imaginative in searching for further direct funds.

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Abbreviations and acronyms

ARIs	Advanced Research Institutes
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
BU	Biometrics Unit
BUCS	Biometry Unit Consulting Service (University of Nairobi, Kabete)
CABI	Centre for Agriculture and Biosciences International
CGIAR	Consultative Group on International Agricultural Research
CIP	Centro Internacional de la Papa (International Potato Centre)
DDR	Deputy Director Research
GIS	Geographical Information System
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IFPRI	International Food Policy Research Institute
ILCA	International Livestock Centre for Africa
ILRAD	International Laboratory for Research on Animal Diseases
ILRI	International Livestock Research Institute
IRRI	International Rice Research Institute
IWMI	International Water Management Institute
NARS	National Agricultural Research Systems
NePAD	New Partnerships for Africa's Developments
RSU	Research Support Unit
SRO	Senior Research Officer
SSC	Statistical Services Centre, (University of Reading, England)
VVOB	Flemish Association for Development Cooperation and Technical Assistance
WAC	World Agroforestry Centre (formerly ICRAF)

1. Background to the review

1.1. Terms of reference

The International Livestock Research Institute (ILRI) commissioned an external review of their biometrics, data management and research support capability.

The areas of ILRI's research support and service functions to be reviewed included: 1) research design, 2) data collection and quality, 3) data management, 4) analysis and interpretation, 5) quality of research outputs relative to biometrics and spatial analysis, 6) documentation, access and sharing of data, 7) reporting.

The terms of reference for the review were as follows:

- Define the needs for the components (1-7) above to support the ILRI research programme. This includes a background needs assessment for ILRI conducted by ILRI for the review panel.
- Evaluate the effectiveness of past and current activities. This includes a stratified sampled assessment of ILRI research projects conducted by the Reading Statistical Services Centre.
- Advise on the required capacity, structure, funding, partnerships and institutional policies and practice for biometrics, GIS, spatial analysis and data management for ILRI.
- Advise on opportunities and the role of ILRI to support agricultural research for development partners in these areas (regional economic communities, development organizations, SROs, NARs).

1.2. Conduct of the biometrics review

The review of biometrics was held from 04 to 08 October 2004 at the International Livestock Research Institute Headquarters in Nairobi and used the following elements:

1.2.1. ILRI Projects Review

The projects review examined the biometric components of a sample of ILRI projects. Its purpose was to assess effectively biometrics was used in ILRI projects, and how projects could be monitored in the future. This information was to be one input to the biometrics review team. Staff from the Statistical Services Centre[1] (SSC) of the University of Reading, UK reviewed five projects and Graham Mclaren, Head of the Biometrics Unit at IRRI, reviewed one project. The projects were designed to cover the full range of ILRI research.

The report is to be on ILRInet. A summary of the results is in Section 3 of this report.

1.2.2. Survey.

A questionnaire was administered to 180 ILRI staff to collect information on ILRI staff needs with respect to biometrics and related support services. Responses were obtained from 108 people giving a response rate of 60%. Biometrics Unit staff were not invited to participate in the survey. The report of this survey is to be on ILRInet. A summary is in Appendix 2 of this report.

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[1] Details of the staff are in Appendix 1

1.2.3. Review team

The review team held discussions with the ILRI biometrics task force, Biometric Unit staff, data analysts/managers not based within the Biometrics Unit, graduate students, Nairobi based project teams and scientists, out posted project staff, the biosciences coordinator and consultants, ASARECA coordinators, and staff from WAC, CABI, IWMI and the University of Nairobi.

2. Context

2.1. Background

ILRI was formed in 1994 through the merger of ILCA and ILRAD and assumed a global mandate for livestock research. Its headquarters are in Nairobi, Kenya, with a second major site in Addis Ababa, Ethiopia and offices in six more countries around the world.

ILRI's mandate is "to enhance the well-being of present and future generations in developing countries through research to improve sustainable livestock production. It works in partnerships and alliances with other organisations, national and international, in the fields of livestock research, training and information exchange."

2.2. The new strategy

ILRI's mission and themes are given in the table below.

Vision	A world made better for poor people in developing countries by improving agricultural systems in which livestock are important.
Mission	**ILRI works at the crossroads of livestock and poverty, bringing high quality science and capacity building to bear on poverty reduction and sustainable development for poor livestock keepers and their communities.**
Mandate	To measurably and sustainably improve the livelihoods of resource-poor livestock keepers, make animal products more affordable and accessible for the poor and conserve natural resources in developing countries through partnerships and alliances for innovative livestock research, training and information exchange.
Theme 1	Targeting research and development opportunities
Theme 2	Enabling innovation
Theme 3	Improving market opportunities – Joint ILRI/IFPRI programme
Theme 4	Biotechnology
Theme 5	People, livestock and the environment

2.3. The broader environment

ILRI operates in a new international and CGIAR environment. Some of the features of this new environment, which affect the needs and supply of research services, are as follows:

- ILRI's global mandate, which requires decentralization of research activities and extensive partnerships.
- Changes in the CGIAR, which require higher levels of inter-centre and ARI-centre collaboration and lead to higher levels of restricted funding.
- Emergence of the Global Challenge Programs, which cut across centre responsibilities and broadly reallocate funding and priorities.
- Regional focus and funding of research efforts requiring new partnerships with associations like NEPAD and ASARECA

2.4. Local environments

ILRI has facilities in Nairobi and the nature of Nairobi as a regional hub with numerous and diverse national, regional and international organizations present makes it an ideal place for collaboration and interaction in the provision of research services.

Facilities in Addis Ababa are also extensive but there are fewer opportunities for 'outsourcing' service requirements. The ILRI campus is host to regional offices of several centres and this provides opportunities for sharing and collaboration of research services.

Other offices are hosted by different CG centres around the world and opportunities exist for obtaining research services from those host organizations.

2.5. Research support and services?

The multi-disciplinary nature of ILRI's research programmes requires a wide range of specialized design, data management and analysis skills, for example for animal and crop experimental design and analysis, epidemiological descriptive and analytic studies, bioinformatics, functional genomic, genetic mapping, participatory studies, indicators for system and process evaluation, and GIS and spatial studies.

The review has concerned itself with the cross-cutting technical skills that are required to collect, manage, archive and analyse data and interpret, report and publish findings.

Some of these skills are an integral part of a research scientist's training, others are more specialised and can be provided either through collaborative research or through the provision of support services. Hitherto, ILRI has designated these skills collectively as "biometrics" and the support services are provided primarily by the Biometrics Unit.

2.6. The biometrics unit (BU)

The mission of the Biometrics Unit is "to assure and enhance the quality of the ILRI research program". It corresponds to ILRI's mission (see Table above). Its work cuts across ILRI's five themes and the unit is based under the direct leadership of the DDG.

From 1997 to 2002 there were two biometry units, one in Nairobi, headed by John Rowlands, and one in Addis Ababa headed by Mamadou Diedhiou. The Nairobi unit supported work in Kenya, while the Addis Ababa unit supported work, both in Ethiopia and elsewhere that ILRI scientists were stationed. The current unit was formed in June 2002 and followed the retirement of John Rowlands.

The unit supports all the themes through the following functions: Statistical consultancy (planning studies, reviews of research protocols and manuscripts); research data management (statistical analysis, provision of technical advice, statistical interpretation); software consulting; and training of staff and collaborators on statistical methods and on usage of statistical packages

The unit has six staff, one international, and five at national level. A senior scientist (Mamadou Diedhiou) heads the unit and is based in Nairobi. One senior data analyst (Sonal Nagda), two data analysts (Crispin Marere, Nicholas Ndiwa) and one administrative assistant (Agnes Odanga) provide support in Nairobi. In Addis Ababa, there is one research officer (Zerihun Tadesse).

The expertise claimed by the five staff include: experimental design (3 staff), sampling techniques and survey design (3), statistical modelling (1), statistical computing and use of statistical software (5), multivariate data analysis (2), database design (2), socio-economic, technology adoption, characterisation of farming systems data (1), statistical analysis of epidemiological and clinical trials data (1), statistical analysis of livestock health and production (2), quantitative trait analysis (1)

2.7. What's in a name?

The term "Biometrics Unit" no longer embraces ILRI's expectations for research support. The term biometrics has traditionally been associated in ILRI with experimental design but other specialized terms are now being used in ILRI, for example bioinformatics, GIS, econometrics, epidemiology, data management, and biostatistics.

In this report we continue to use the term "Biometrics Unit", usually abbreviated to BU. ILRI may wish to choose a different name, such as Research Support Unit or Biometrics and Research Informatics Service.

3. Need for the ILRI research support services

The need for research support was assessed from the following:

- The responses to the internal survey of the Biometrics Unit,
- The assessment of six projects conducted by the Reading SSC
- The observations made by the review team in discussion with ILRI staff.

We summarise the results from these three components. In this section we consider primarily the need for support services. The supply of services and opportunities for the future are in sections 4 and 5.

3.1. Survey

The survey showed ILRI staff are very positive about the current role and future potential of the BU.

They consider the Biometrics Unit to be useful, though understaffed. It should broaden its skill base, become more closely involved in projects and become proactive.

The detailed results are presented on ILRInet. A summary is in Appendix 2. Many of the points raised in the survey were followed up and confirmed in the discussions with the review team. They are therefore described in later sections.

3.2. The project reviews

3.2.1. Report from the project review team

The project review team prepared a detailed report on each of the six projects that were reviewed. The main points were consolidated into an overall report that is posted on ILRInet. Key points are summarised here.

On design, the activities included participatory studies, surveys and experiments. For each type they found examples of good practice, and others that had defects, or where the description of the design did not provide evidence on how the data were collected. They found it difficult to track down protocols and sampling plans relating to the activities they reviewed.

There is no common method of managing data in ILRI. Methods are specific to an individual or project. In general they found that the raw data, in particular questionnaires were stored in a well-organised way. However, meta-data[2] were lacking in most cases.

Access to data was also person-specific. One or two staff held information about the data and access and understanding of the data therefore depended on their availability.

None of the projects had a data archive of all components of the project.

On analysis the points were more varied. Results from surveys were usually only presented descriptively, i.e. without standard errors. This can mislead readers to interpret sample results as if the exactly reflect the population.

They found that advanced methods were often used. Though most were applied appropriately, they found some staff had a preference for a certain method. While

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[2] The meta-data is the information that describes the data stored and provides an assessment of the data quality.

sometimes appropriate, the project review team encouraged a broader, more open approach to the tools for analysis.

Overall the project review team suggested that ILRI introduce project-monitoring processes that are active during the life of the project. This would also help projects in compiling an archive of all research products as they emerge from research, rather than at the end of the project.

They also suggested that ILRI BU should introduce guidelines on data management, the use of participatory methods, on survey practices and on the use of secondary data.

They recommended a strengthening of biometrics and data management support to outreach projects and collaborating NARS partners.

Finally, assuming ILRI introduces mechanisms for their own quality assurance, they recommended that guidance is needed on the implications of such procedures in projects where an institution other than ILRI has the main responsibility for the work.

3.2.2. Reactions to this report

One reason that ILRI proposed the project reviews was to identify how statistical aspects of projects could be monitored in the future to assure ILRI that their work constitutes high quality research.

Only a few projects were reviewed, but the project review team was satisfied that the key messages were clear. Our view is that these messages probably apply equally to other CGIAR centres, and also to ILRI's partners. Hence possible improvements should address also the role of ILRI in biometric support in relation to her project partners.

We find the imperfections in the statistical aspects of the projects to be a serious cause for concern. It is in no sense a crisis, but confirms that this review of biometrics support is timely.

In earlier ILCA/ILRAD days, most of the research activities were centrally funded. Hence the research discipline was at the activity level and dictated by the institute's standards.

Much has changed since then. Now projects are individually funded, and the monitoring is primarily the responsibility of the project leader. This monitoring has to satisfy the donors requirements.

This responsibility is unlikely to change. What can be done is to support project leaders and team members to conduct the statistical aspects of their research to the highest possible standard. The uniformity of the statistical support should help theme directors in their monitoring of the research projects for which they are responsible.

3.3. Interviews

The review team spent most of the four days discussing the items in the terms of reference with ILRI staff, and with some staff outside ILRI. In this subsection we summarise the views expressed on the needs for statistical support.

3.3.1. Nairobi based project teams

The discussions confirmed the views expressed in the survey. No one was negative about the BU. Most agreed that the BU should be more proactive, and publicise their services. Some felt that the BU gave them good service in experimental design, but doubted their ability to support more specialist areas for example, quantitative genetics, surveys and econometrics. Some stressed the need for BU staff to add to their skills, e.g. meta-analysis, participatory research methods.

There was concern by one person about the lack of a clear statistical software strategy, and by another, that advice to junior staff may not have been as sound as when senior staff were present.

Two groups, genetics and the East Coast fever vaccine group, saw the biometric staff as integral to their teams. Both expressed satisfaction and a continuing need for this support.

In these projects, we had the impression that the biometricians were seen as "supporters" rather than "full-team members[3]". With ILRI's new structure it would be advantageous for them to be full-team members in both these and other projects that pay substantially for BU inputs. This would also assist the job satisfaction of the BU staff.

3.3.2. MSc and PhD Students

The students very much appreciated BU support. Some found the costing of the support to be an impediment. ILRI staff were also very appreciative about the role played by BU in support of their students.

Some PhD students had problems (e.g. statistical programming in R) where they felt the BU did not have the specialist expertise.

3.3.3. Addis Ababa staff (telephone discussions)

Staff were satisfied with the service. They did not see the departure of the senior statistician to Nairobi as a serious problem, because they could always contact him by e-mail and phone. They were concerned about data management and archiving, but also about the burden of any additional quality control on scientist's time.

They recognised that skills were lacking in some specialist techniques and proposed that consultants be hired for such inputs.

3.3.4. Out-posted project staff (telephone discussions)

Staff in IITA and Niger were particularly preoccupied about the licensing of statistical software. Staff in IITA faced data organisation problems for historical data.

They proposed using local resources, either in IITA, or in NARS, for their statistical support. This parallels staff views in other centres.

The one member of staff based in ICRISAT, Niamey has a difficult situation for advice, and for software, because there is little support locally. In the short term he will discuss the options with BU staff, when visiting Addis Ababa in November.

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[3] In some projects it may be useful if this suggested change causes reflection on the procedures for what constitutes full involvement of all team members.

4. Supply of research support and service

In Section 3 we concentrated primarily on the need for research support services. Here we look at the sources of supply that can fulfil these needs.

4.1. The Biometrics Unit

4.1.1. Clientele

The clientele come from all the themes. Our impression is that the clientele is biased towards the junior staff. This corresponds to the staffing in the BU. If true, then this support is valuable, but there is additional support that BU could be providing at the conception and initial stages of project development.

4.1.2. Training

The BU has conducted short training courses for ILRI staff and these have been much appreciated. There is a continuing demand. They tend to be introductory courses.

We were shown some of the training notes prepared by ILRI staff. They were adequate but many could be more exciting. There may have been other notes we were not shown.

ILRI and WAC have agreed to have a joint site with their biometric resources. Currently the resources are only from WAC. From what we saw, we can understand why ILRI staff are not yet ready to include their notes. We hope that their notes will be improved, perhaps in conjunction with the next series of training courses. They should then be included on the web site. Collaboration between the WAC and ILRI biometricians obliges both partners to contribute.

WAC and ILRI, together with the respective training divisions have agreed to run a joint programme of training for incoming research students. This is tentatively a 2-week training, and will be compulsory. It will be run regularly, and where there are spare places, they could be attended by other ILRI staff, or by participants from other organisations. We hope they will start, as planned, in the first quarter of 2005.

ASARECA plans to include capacity building in its forthcoming work, and to involve the BU in these activities.

4.1.3. Budget

The unit's budget is about $280,000 per annum, from which about half is recharged to ILRI and non-ILRI projects[4]. When there were two senior staff the maximum that was recovered from projects was 80%.

4.1.4. Overall

We had joint and individual discussions with the BU staff. We found them to be a well-motivated group. They were concerned about the career structures as they felt the basis for staff evaluations might not always apply to their work.

There had been some management problems within the unit, partly related to the fact that the head had been commuting between Addis Ababa and Nairobi for the past two years. These are not insurmountable particularly as the unit is now more settled.

They considered that the system of charging for all their services was inhibiting the advice they could give. They responded positively to the many challenges posed by

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[4] The full costs are therefore about 1% of the research budget, and the net cost to overheads is therefore about 0.5%.

the survey. Some of their suggestions for work, mainly in the next 6 months are in Appendix 5.

4.2. Other statisticians in ILRI

The staff in Nairobi includes a large and diverse group of support staff with statistical skills. Some have an MSc in statistics, while others have few formal qualifications. This resource could be very beneficial if organized into communities of practice. These benefits could be for both the individuals and for ILRI.

4.3. Other suppliers of research support

There is considerable expertise on many of the specialist needs within the institute, for example epidemiology, bioinformatics, econometrics. There is great potential for informal exchange, seminars, and for networking of the staff, perhaps coordinated by the BU.

One suggestion from these staff, was that six specialists, already working in ILRI projects, could provide support and training in spatial statistics[5] for about one month per person. The BU would coordinate (and pay for) this input, with payments largely being recovered from project (or training) funds.

4.4. Information Technology

There was agreement that the current separation of IT services for administration and research is appropriate. The IT unit should provide infrastructure, connectivity, office software, storage, backup and disaster recovery facilities while BU should support statistical software, data management and archiving.

There was discussion on the interface between administrative and research informatics. It was felt that ITU should support project management through the prioritisation, planning and budgeting phases and BU should support at the activity level on protocol development, data management, archiving, analysis and reporting.

Data management was identified as a serious institute-wide problem. It was agreed that it should be handled at the project level in conjunction with data collection and be supported by BU rather than the IT unit.

The current post of IT manager is a joint one between WAC and ILRI. This is relevant, because there was earlier exploration on merging the biometric services. The discussion highlighted some difficulties of this collaboration, because of the different salary structures in the two institutes. It was also stated that if more staff are needed, it is cheaper to hire staff in Addis than in Nairobi. There are opportunities for hiring programmers in Addis.

4.5. GIS support

ILRI have many research staff involved in GIS. In addition they have recently set up a small service unit to provide support on GIS and possibly also on spatial statistics. This is not in a research theme and hence parallels the biometry unit, but for this specialised service. The two areas of overlap are spatial statistics and data management.

It is investigating charging for its service in the same way as is used by BU

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[5] Spatial statistics was the specialist area that was most in demand for support in the responses to the survey. The same formula could perhaps be applied for other specialist areas.

4.6. Outside consultants and partners

The previous head of BU still provides support to a number of projects on a consultancy basis. Projects also currently use outside consultants to provide some biometrical support. While both are perfectly justifiable from the point of view of continuity, attempts should be made to ensure the outside consultants also upgrade the skills of BU staff so that BU can extend the range of support it is able to offer.

5. Opportunities for future research support and services

In this section we consider the discussions that provided opportunities for a strengthened role for the BU in the future.

Improvements will require the support of senior management. Their interests and concerns are evident partly in their commissioning of this review. Given the positive reactions of both ILRI staff and management to the importance of biometric support, we view the involvement of senior management as an opportunity for an improved service for the institute.

5.1. Projects

In Section 3 we mentioned work with two groups where the BU has a large role. They were the genetics/genomics group and the East Coast Fever vaccine group.

We asked the BU to list the full set of projects (conservatively) where the current or future work would correspond to team membership. This list used three quarters of the time of the senior data analyst in Nairobi, and of the research officer in Addis. It more than used the time of the senior biometrician. The time estimates did not include two current proposals that have specifically allocated funds for biometric support. If these are funded then an additional 40% of senior staff time is needed, for the next 3-5 years.

This list does not include training courses in ILRI, or the BU support to those research students who are outside these projects, etc. It is easy to see why the BU is busy.

5.2. Biosciences

The review team met with the Coordinator of Biosciences East and Central Africa and with consultants working on the business plan for the biosciences centre. The team was shown a draft of the business plan and asked for comments. A response was made to the coordinator by letter and a copy is attached as Appendix 3.

The review team recommends that biometrics needs to be re-emphasised as a core competency required to ensure rigor and quality of work to be conducted in the centre and that this competency is distinct from bio-informatics. ILRI is in a unique position to provide this support by updating skills and extending the mandate of the BU.

Bioscience staff at ILRI felt that such support from ILRI would compromise the independence and regional ownership of the biosciences centre. They also felt that the necessary capacity was particularly specialized and should be provided by contract or post-doctorate staff working on individual projects.

5.3. Other CGIAR centres

WAC is the obvious collaborator and there have been extensive interactions over the summer of 2004. We strongly urge ILRI BU staff to continue this interaction and look for ways that it can become a true and long-term collaboration.

In the immediate future one benefit is in the data management area, where the two units have started to work together.

There are ILRI staff in other CGIAR Centres, namely CIP, IITA, ICRISAT and IRRI. With the ease of electronic communication, strengthening contacts with the statisticians in these institutes could give more support to the ILRI scientists there. The contacts could also provide materials that are of value to ILRI and to collaborating staff.

There was a discussion of different ways of charging. WAC did not have hourly charging, and IWMI had abandoned it. (IRRI also does not have hourly charging.)

5.4. Other organisations in Nairobi

There are other organisations in Nairobi that both supply and need statistical support. The BU already collaborates with statisticians at the University of Nairobi and this should continue.

CABI had tried many permutations to obtain statistical advice. Their dependence on project funds makes long term, broad support difficult to organize, but they are willing to consider sharing the costs for an international staff member.

5.5. Training for MSc and PhD Students

A proposed (compulsory) training scheme for new trainees was outlined. WAC and ILRI research support units, together with training staff from each centre, had prepared this scheme. This is due to start in early 2005, and to run 3 or 4 times each year. It will be paid out of trainees' bench fees. When courses are not full, they could be attended by ILRI staff, and partners or by outside participants.

An outside organisation may be contracted to conduct part or all of this training. We met with staff from BUCS, University of Nairobi. The anticipated collaboration on the curriculum development should help all parties, because the same skills would be equally useful to University of Nairobi (and other) postgraduate students.

5.6. Networks - ASARECA

The ASARECA livestock coordinator is based in ILRI. They have engaged an MSc statistician (previously with KARI) who will be responsible for combined analyses of the data from their regional trials. They anticipate also using the services of the BU for additional support.

They also have funds for capacity development and anticipate needing considerable time from BU in this area. We suggest that working through ASARECA (and other networks) is potentially an excellent way for the BU to contribute to capacity building in the NARS.

6. Effectiveness of current research support and service

6.1. Criteria

The duration of the review precluded an evaluation of the effectiveness of the current research support service. We nevertheless outline our impressions, because they underpin the recommendations that are in the next section

Effectiveness can be assessed in terms of the following:

- Satisfaction of the institution and its scientists
- Quality of the research output
- Efficiency of procedures
- Cost of the service

6.2. Satisfaction and quality

Broadly the survey and our discussions indicated that scientists were satisfied with the service they received from the BU. There is also considerable expertise in the different themes, and we deduce that scientists are happy also with their project outputs.

However, the project reviews indicated that there are real causes for concern. The institution seems to be concerned. The main concern is that the quality of the research output is not always what might be expected from an international institute.

Much has changed in the work done by CGIAR centres in the past 15 years, both in the types of activities and in the way the organisations are funded. While many of these changes are to be welcomed, some have contributed to a decline of research discipline, which was previously afforded by centre-wide planning and reporting standards which have been eroded by project responsibilities. .

When ILRI (as ILCA and ILRAD) were largely core funded, they set their own standards for research quality. Activity protocols would be prepared and assessed. Logbooks (real books) would be kept that recorded the activities as they were undertaken. Results would be written as a routine, for annual reports and not just for publications or policy briefs.

Now the standards seem more to be set by the donors.

Theme directors recognised the problems, but were also anxious to limit any added burdens that might be placed on their staff. This is a genuine concern and one where the BU should play an important role. For example simply requiring projects to prepare a comprehensive data (and meta-data) archive is a burden. But providing support on how staff can manage their information from the start of their project could minimise the work of preparing the archive and be a benefit for the project in easing the process of data analysis.

6.3. Efficiency

The BU already has some expertise in areas such as data management, but its lack of visibility means that many scientists do not use this expertise. The lack of recommended procedures, for statistical software, data management, etc provided by the BU on their web page is an indication that they could work in ways that are more efficient for the institute as a whole.

The current system of charging for all services (however small) appears to one way the current system lacks efficiency. Where large inputs are required from BU, the project clearly must pay. But small inputs, particularly at the start of a project, can

often add greatly to the effectiveness of the research and should be part of overhead support to ILRI projects.

One example is the individual support given to ILRI's research students. They only need small doses of support, because the student will do the main work, as part of their degree. Paying through the student's overhead, and possibly increasing the overhead to accommodate this component is likely to add to efficiency, both in the ease with which the support can be provided, and in minimising paperwork.

Another aspect of efficiency is to ensure that the level and skills of the BU match the demands. Currently two of the five staff work largely as technicians. There will be less demand for support at this level, compared to higher levels. The current staff are enthusiastic and may be able to make this change. Such a change will also require skilled management.

Specialist skills in such areas as spatial statistics, econometrics and biometrical genetics are currently embedded in project teams. This makes it difficult for other projects to access these skills. Ways need to be found to upgrade BU skills and/or network these dispersed assets into an expanded 'virtual' support unit.

While staff in Addis Ababa felt that statistical support there was currently adequate, they felt that data management needed much improvement. One observation made by the head of IT was that programming staff were more easily available and considerably cheaper in Addis Ababa than in Nairobi, and this may offer an opportunity to provide programming support for data management in Addis Ababa even if supervision is from Nairobi.

6.4. Indicators

Finally we consider the issue of efficiency indicators. Simple cost recovery indicators such as "the unit has recovered up to 70% of its costs" will not be so useful in isolation in the future because they push BU activity away from some core responsibilities of providing institutional support for quality assurance, data integration and data access.

Indicators are inevitable and can also be of great help, to both the BU and to the institute, if they are well designed. For example, if statisticians are routinely invited to contribute to initial planning meetings, then we might expect more projects to either budget for statistical input, or describe how they will handle the statistical aspects of their work.

If the BU supports a system of data management and archiving, then we could record the proportion of projects that is able to supply a usable data archive. And if ILRI is asked to defend its recommendations, then we could also record which projects include detailed information in their archive, that underpins recommendations, or policy briefs that result from the work.

Much of statistical advice is generic and hence can be made available on the BU web site. Monitoring this information could be useful.

7. Recommendations for research support and services

7.1. Quality assurance

ILRI strives to attain the highest quality of science and there are a number of research support activities that would ensure the maintenance of first class work

7.1.1. Protocols

Currently protocols for animal experiments are formally reviewed and approved through the Institute Animal Care and Use Committee. Although the primary reason for approval is an ethical one, the procedure involves the approval of the design by a senior statistician. We recommend that all activity protocols be subject to a review process that ensures the relevance of their objectives, the efficiency of their design and that ethical requirements are met.

7.1.2. Reports and publications

Detailed reporting of the data, methods and results should be produced as the norm. These provide the "below-decks" evidence that underpin the "above deck" recommendations that are made from the project results.

Currently the reports produced for projects seem often to be either to donor requirements, or published papers, or policy briefs. In projects where no papers are published immediately, there may therefore be no detailed reports.

This activity will not necessarily distract researchers from other work. Just as the protocol provides the information for a detailed methods section in a publication, so this detailed reporting provides the information for the results sections.

These reports also permit reflections on the methodology used to collect the data. Any information that is not worth analysing provides an indication that it need not be collected in a future study.

7.2. Data management

ILRI has gained its reputation through prolific research output. Modern computers and database software now make it possible to archive data for further analysis. ILRI should develop and enforce a data management policy in order to make its data widely available and accessible. This will entail:

- Endorsement and implementation of a data management policy, which includes rules and regulations on the ownership and use of data, and archiving of project level data and metadata.
- Development and implementation of an ILRI-wide system for data management that facilitates efficient capture of data and metadata, ensures their broadest accessibility for analysis and can be used for as a tool for monitoring and managing projects.
- Allocation of resources and designation of institutional and theme responsibility for implementation of the policy and maintenance of the system.

7.3. Multi-disciplinary research

The scope of ILRI's work is broadening to target poverty more directly and this expressly embraces a multi-disciplinary approach to research. Statistical methods are relevant across the variety of projects being undertaken. A variety of statistical skills exist in the themes, for example in spatial analysis, econometrics, epidemiology etc, and in the Biometrics Unit. These skills can be harnessed effectively by putting in

place formal procedures and incentives for sharing these specialized skills across themes.

7.4. Research support services

There are common statistical procedures and methodologies that are important across projects and themes. To maintain quality and consistency, responsibility should be allocated for:

- Developing and maintaining a software policy. The BU would be responsible for keeping up to date with ILRI scientists' needs and the latest technologies, advising on institutional acquisition of software, and the provision of support for the selected software.
- Providing statis tical and data management advice and support. The BU would be responsible for helping scientists and students with project design, data collection and management, statistical analysis and reporting
- Provision of Methodology, information.

7.5. Research

One of the needs expressed by some ILRI staff was support in "cutting-edge" methods of analysis. Areas mentioned include genomics, spatial statistics, meta-analysis and the integration of qualitative and quantitative methods.

We distinguish between applying recently developed statistical methods, and finding that statistical research is needed to develop new methods.

The priority for ILRI projects is in applying existing methods. This may require inputs from outside consultants. The priority for biometric staff in ILRI is their support for ILRI's research. If new statistical methods are needed, then the BU should work in collaboration with university staff, rather than in developing methods themselves.

7.6. Provision of research support

To encourage use of the services and hence the quality assurance for the organisation, we suggest:

- Initial discussions are part of project overheads, rather than a direct charge to the project. This is the situation in WAC, IRRI and elsewhere. This could include discussions on design, data management and on analysis.
- Where the total time is envisaged to be longer than "initial", perhaps a total of one day per project, the interactions should be included, as now, in the project budget.
- Other activities attributed to overheads would be as agreed between BU staff and management. These are the proactive activities undertaken by the BU. They would include aspects of quality assurance for the Institute. To this might be added a coordination role, for the support services available in ILRI.
- A member of BU staff would normally be invited to initial planning discussions.

7.7. Capacity development

Poor degree-level training courses in statistics will ensure a demand for in-service training courses for the foreseeable future. This is an important component of the unit's work. It is also potentially a "bottomless pit". So that training courses are sustainable and effective we suggest as follows:

- Courses should, wherever possible be fully funded.

- Courses should have well-defined objectives. These will often be objectives that relate to project outputs. Training with NARS may involve a sequence of courses that relate directly to their research projects.

We suggest five types of capacity development

- For ILRI staff. These may be basic courses, as in the past. Increasingly there could also be training on more advanced and specialised topics. They may be given partly by consultants initially, and then by ILRI staff if repeated.
- For ILRI/WAC MSc and PhD students. The two centres outlined this training, prior to the biometrics review.
- For NARS staff in ILRI's main centres, particularly Kenya and Ethiopia.
- For NARS staff in units that are connected to ILRI projects
- In support of network, particularly ASARECA, activities in the region

In each case, the development may be a short course. It may also include the preparation of training materials, or the attachment, or exchange of staff. The needs of the different CGIAR centres are similar in this regard. Hence these activities are ideal for inter-centre collaboration.

The Unit is currently involved in the development of training resource, funded by a Rockefeller grant. This is an example of a project where the funds were negotiated by the biometrics staff. The Unit should look imaginatively at ways of funding similar activities in the future. Given the needs for improved statistical practices generally, it should be possible to secure continued funding for activities related to the development of training resources.

7.8. Outreach Projects

As ILRI engages its world mandate it will inevitably do more work at locations distant from Nairobi and Addis Ababa and also more work in collaboration with NARS partners. These factors increase the need for research support and complicate its delivery. All outreach projects should be required to estimate needs for support and training and to budget these if necessary.

ILRI should negotiate with institutions where outreach projects are hosted for the provision or exchange of research services such as access to statistical and data management software, statistical consulting and programming. This is in line with the CGIAR vision of greater inter-centre collaboration and would be welcomed by most institutes. In the end, moves to system wide provision of these services may be feasible.

7.9. Time scales

We suggest that developments in quality assurance and in the possible work of the BU be considered within three time scales, short (6 months), medium (2 years) and long.

7.9.1. Short term

Within a six-month period we suggest as follows:

- ILRI to engage a staff member to work on data management, in collaboration with WAC. Data management support and activities would start, at both a BU and a management level.
- BU has proposed a series of activities, partly resulting from suggestions in the recent survey. A timetable is provided as Appendix 5. Progress on these activities should be reviewed at the end of this six-month period.

- One round of training for ILRI/WAC research students should be given and evaluated.
- The ILRI/WAC web site should contain resources from ILRI as well as WAC. WAC to confirm that the work involving the two units is genuine collaboration.
- A follow-up to the Rockefeller-funded biometrics training resource should be clarified[6]. Other opportunities for funded training initiatives, particularly through ASARECA, could be investigated.
- ILRI should map out its role with respect to research support for Biosciences East and Central Africa and take steps to acquire skills and personnel as required to meet any new responsibilities in such a way that both ILRI and the biosciences centre are strengthened.

At a more major level, the future functioning of the BU should be clarified during this period. As preparation, the BU should prepare a full list of current, and potential work where their inputs would be funded through the projects. This list is needed for any case for staffing.

7.9.2. Medium term

Within a two-year period we suggest:

- Activity protocols be prepared and subject to a review process.
- Support is given for project-level archiving. This will require work at both a technical level and to establish rights of access. The document on Archiving that was prepared for the project reviews is attached as Appendix 6.
- The requirement of a project-level archive to become the norm for all new projects.
- A project-monitoring process to be established for all new projects (at least). This to be the responsibility of theme directors.
- An investigation be made of how the information required for project-level monitoring and a data archive relates to the requirements of individual donors.
- BU should have expanded its range of competencies, either by upgrading skills of BU staff or by forming and supporting a network of ILRI staff (and perhaps staff from other centres) into a virtual team able to provide support in specialist areas.

7.9.3. Long term

If the medium term objectives are realised, then ILRI will retain its position as a leader in the conduct of research that is of the highest possible quality. The role of the biometrics unit would be, as stated in its goal, "to assure and enhance the quality of the ILRI research program".

From this position of strength, ILRI should again investigate opportunities for a merger of research support units of ILRI, WAC and other institutes with interests in the region to provide a broader base of support with greater efficiency than is possible by individual centres.

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[6] Currently John Rowlands and Habib Ibrahim, who have both left ILRI, handle this activity.

8. In conclusion

In this final section we suggest a framework within which the BU might operate.

We explored various scenarios. At the extreme of almost full cost recovery the BU staff could return to work on individual projects, as do the other statistics staff in ILRI.

This direction was rejected, partly because of the difficulties of supporting institute-wide standards in research. Intermediate possibilities include leaving the BU roughly as at present, perhaps with the addition of resources to support effective data management and archiving.

We prefer and hence propose an expanded Research Informatics Unit comprising BU, plus data management and the service GIS role. This plus a strong network of other research support resources inside and outside ILRI including those for spatial statistics, epidemiology and bioinformatics.

The BU component must upgrade their skills to better cover in-service and outreach training and support in biometrics and data management, and to support biometrical genetics including mapping and association methods (because this gives them the key into bioinformatics), participatory methods, meta analysis etc.

Outside partners must include WAC and the Biosciences Facility but could also include other national and international organizations.

This unit would require and warrant another senior national or international scientist. However the workload from projects and by collaboration with biosciences and perhaps other organizations, should mean that most (if not all) of the extra funds would be recouped from project, or consultancy work.

The longer-term vision would be to establish a regional hub of excellent research support with contributions from other CG centres working in the region as well as close links with national institutes. This would match and complement Biosciences East and Central Africa for which ILRI is already the touchstone. Such an initiative would be consistent with the current CG vision and provide a model for other regional hubs. This would, in turn, benefit ILRI's global mandate.

Funding this expanded unit would require "pump-priming" over the next two years. This would support the new initiatives on data management and the expanded statistics role. From then, the costs from overheads should be only little more than they are at present, probably remaining less than 1% of the ILRI research budget. All other activities would be recovered from project funds that have a biometrics support component, or from funds generated directly by the Unit.

Appendix 1: The review teams

Biometrics review team(4-8 October 2004)

Abdoulaye Adam (a.adam@afdb.org)

Abdoulaye was the biometrician and also head of research for the national agricultural research programme (INRAN), Niger. The then worked as the statistician for WARDA in Cote d'Ivoire and is now a statistician in the African Development Bank.

Sarah Macfarlane (macfarlane@globalhealth.ucsf.edu)

Sarah was reader in statistics in the Liverpool School of Tropical Medicine, before working in the Health Division of Rockefeller. She is currently Visiting Professor of Epidemiology and Biostatistics in the Global Health Sciences, University of California, San Francisco.

Graham McLaren (g.mclaren@cgiar.org)

Graham was head of the biometrics service in the national programme in Zimbabwe, before working as head of Computing and Biometric Services at the Institute of Agricultural Research, Cameroon. He is new head of biometrics and bioinformatics at IRRI.

Roger Stern (r.d.stern@reading.ac.uk)

Roger Stern was Senior Lecturer in statistics at the University of Reading, before working as biometrician for ICRISAT, based in Niger. He is currently chief biometrician in the SSC, University of Reading.

ILRI Biometrics project review team (20 September – 3 October 2004)

Eleanor Allan (e.f.allan@reading.ac.uk)

Worked as a statistician in the pharmaceutical industry, before joining the SSC, where she is director. Her interests include statistics applied to livestock, agricultural and environmental areas.

Carlos Barahona (c.e.barahona@reading.ac.uk)

Has an initial background as an agronomist, before training in statistics. He is currently senior statistician in SSC. His interests include data management and the integration of participatory with statistical methods.

Fiona Underwood (f.m.underwood@reading.ac.uk)

Worked as a statistician for Scottish Heritage and for ICRISAT in Niger and Mali, before joining the SSC. Her interests include sampling and surveys.

ILRI Task force

John McDermott: Deputy Director General (Research)
Ade Freeman: Director Theme 1 (Targeting Opportunities)
Ed Rege: Director Theme 4 (Biotechnology)

Appendix 2: ILRI Biometrics needs assessment survey

Overall

The questionnaire and the detailed results are presented on ILRInet. Of the 108 responses 75 were from Nairobi, 20 from Addis Ababa and the remaining 13 from other sites.

There was about a 60% response rate. Informal checks with non-respondents indicated "too busy", "just arrived" reasons, unconnected with the views on the BU. We therefore accept the responses as representing the views of ILRI staff overall.

Anticipated use made of the BU

The responses indicated that the BU was appreciated, and was felt to be contributing effectively. In the future, ILRI staff expected to need support in all the areas listed in the terms of reference.

Examples of questions on expected future use of the service were as follows:

"Over the next two years, in what stages of research would you like Biometrics Unit input to your work, or to the projects you manage (select all relevant responses)".

The results included 30% of staff on research planning, 60% on research design, 70% on data analysis and 50% on interpreting and reporting results.

"Over the next two years, how would you like the unit to be involved in your work or projects?"

The results were that more than 50% of the respondents would like BU staff present at planning or review meetings. A similar percentage would like to attend training courses.

On the question that related to the areas not currently covered by the unit, the key area in demand is spatial statistics, though there is also a demand for support in epidemiology, econometrics and other areas.

Despite the higher cost, the level of support needed was either at senior biometrician level (60%) or junior biometrician level (50%). There was much less need for technician-level support

Individual responses indicated that staff valued the work done by the unit, but felt it needed more staff. Examples include the following:

- "We are satisfied with the assistance provided in the past three years." Other comments supported this sentiment. For example, "I haven't experienced any problem with the unit so far. They are doing a great job".
- "Increase staff training at ILRI, on basic biometric techniques, to reduce basic requests to the unit. Employ at least two more staff to support the unit." The comments on the need for training, and also to employ more staff were repeated often.

Problems and constraints in interacting with the BU

The question *"How useful were the inputs from the BU"*, indicated that most staff found the interactions to be "useful" or "very useful".

The following question was *"What limited the value of the inputs, or prevented you from making use of the BU services?"*

Of the 76 people who responded, 16 (20%) stated they did not need support in the areas offered by the BU. Only 6 respondents gave inappropriate skills and

experience of the staff as their reason. Half the respondents added a comment; most to say there were "no constraints".

Specific constraints mainly echoed points made elsewhere:

- "Biometric charges." "Cost of engaging help from BU."
- "Staff are generally too few and too busy." "Input was valuable. I only wish they had more time."
- "I can comfortably handle some of the services they offer. I feel the unit is biased towards biological services." "None of the biometricians is versed with econometric data analysis."

Suggestions for changes to increase the value of the BU

Over half the respondents made suggestions for the question *"What changes to the BU would improve the value of the unit to you and your projects?"* Some took the opportunity to emphasise that they were happy with the current service.

Examples of responses that suggested changes were as follows:

- The first step should be creating awareness of all the services provided, indicating who is entitled to use them. Many other comments supported the need for the unit to become more visible and to be more proactive in offering their services.
- "They should get staff who have skills in epidemiology. They are good in statistics." Other comments addressed different specialized skills, for example "We need statisticians with a social science background to be part of the biometrics team i.e. econometricians and spatial statisticians."
- "We deal with many problems involving spatial statistics, models for longitudinal data, sample surveys, mixed models, advanced multivariate statistics and model selection. Sometimes considerable programming is needed beyond what commercial software offers to implement calculations. Having good programming skills in biometrics would thus be useful as well as helping people understand the logic underlying models they are using."
- "Should interact more on database and data management issues". "I would particularly value guidance on the area of data management. How best to have information archived and stored so it is accessible easily. This seems a major challenge as many researchers are reluctant to make this extra step – how can we make it a routine and valuable part of what is done?"

The responses above inevitably overlapped with those to the question *"Do you have any other comments on how the BU could be staffed, funded, managed or evaluated to make it more effective?"* Points in reply included:

- "The unit should be one of the strongest components in ILRI. It could also provide capacity building services to NARS and others such as graduate students." Other responses emphasised the potential of the unit in relation to NARS.
- "The unit needs to interact more closely with the projects. In this way part of their time could be covered under specific projects. I'm not sure if there are any laid down guidelines as to how this unit feeds into the specific ILRI projects." "Biometrics staff being an integral research team member and available at project implementation and study design."

- "The people with knowledge in statistics are not necessarily only the biometrics staff.. They may work in different fields. It would be interesting to know who they are and be able to share experiences and/or to get assistance."

Finally we repeat two key topics:

- "Biometric should be a free service to programme/project. A general fee should be paid out of core and programme budget. This will increase the interaction." The question of charging was also raised repeatedly in the discussions with the review team.
- "There is fundamental need for better COMMUNICATION by the Unit across ILRI as to new developments in statistical packages, what services the Unit offers, new opportunities for training and capacity building, etc. The Unit is currently invisible. True service can only be achieved with a higher profile."

In summary, ILRI staff consider the Biometrics Unit to be useful, though understaffed. It should broaden its skill base, become more closely involved in projects and become proactive.

Appendix 3: Letter to Biosciences, Eastern and Southern Africa

7/10/04

Coordinator
Biosciences Eastern and Central Africa
ILRI Campus
Nairobi
Kenya

Dear Dr. Ochanda,

Thank you very much for sharing the draft business plan with the ILRI Biometrics Review Team. As we mentioned in our discussion we are keen to see strong links in the future between biometrics at ILRI and in the new biosciences facility.

It was interesting to read your thorough business plan and We were pleased to see the emphasis you intend to place on core competencies as this is clearly as much of a limitation for biosciences in Africa as is a lack of facilities. Biometrics is mentioned as one of the necessary core competencies in the executive summary and its necessity may taken as obvious. However, it would be valuable to highlight the central role biometrics plays in Box 1 and in Box 4.1 which both appear in several places.

Box 1 – 'Applications of areas of scientific and technical core competencies' covers the major applications of several disciplines. We would recommend inserting a line in Box 1 indicating the main application of Biometrics which is to guarantee the appropriateness and efficiency of experimental designs, the reliability of results and the ability to interpret analyses. This is crucial for expression experiments, whether RNA, protoeomics or metabolomics, as well as for phenotyping experiments in the field. It will also be a crucial component in mapping and MAS.

In Box 4.1 'Areas of scientific and technical core competencies and supporting infrastructure', biometrics should appear as a section in this table and it includes the following competencies:

  a. Experimental design for phenotype and genotype characterization
  b. Management and integration of complex data sets
  c. Statistical methods for analysis of phenotyping, expression and mapping experiments
  d. Methodology for evaluation and linkage of phenotypic and molecular diversity
  e. Statistical genetics applied to association mapping and breeding experiments
  f. Quality control procedures for laboratory and field experiments

Infrastructure required for biometrics includes access to computing facilities and statistical software as well as links to the international community of biometricians. There is always a large requirement of capacity building in biometrics.

The determination of Biosciences Eastern and Central Africa to provide access to these core competencies as an integral package with the infrastructure is one of its strongest features and should be highlighted in your section on Success Factors (1.4). We would strongly recommend that a biostatisticain or biometrician be involved as much as possible in the design and development of the project. The interaction between such an expert and others in the team would help to clarify the integrative role of statistics and its relationship to bioinformatics which is another core competency you have quite correctly highlighted.

The Biosciences facility is an exciting development. Thank you very much for giving us an opportunity to review your business plan. I wish you every success in its development and I look forward to interaction with Biosciences Eastern and Central Africa in the future.

Yours sincerely,

Biometrics Review Team
International Livestock Research Institute
Nairobi
Kenya

Appendix 4: Sources of funding for WAC's research support unit (RSU)

Three sources of funding are currently and will continue to support the work of the unit. The advantages and disadvantages of each are summarized below.

Source	Advantage	Disadvantage
1. Overhead income	Many RSU activities are seen as 'essential support' which overheads are designed to cover. Funding from overheads allows the unit to work where it will be most effective rather than where there is most money. Transaction costs of the small unit are minimized.	Competition for overhead funds limits scope of work that can be funded this way. Funding is risky There will always be those in the institute who consider an overhead funded unit as a 'free ride'.
2. Budget lines in funded projects	Clear specification of what is to be done Funding secure for the duration of the project.	The project needs for RSU input often not realized when the project is designed. Some donors consider 'essential support' to be covered by overhead or core contributions. Reduces flexibility in how and where the unit works – determined by finance rather than need. Increased transaction costs
3. Special projects to support RSU work	Clear specification of what is to be done Funding secure for the duration of the project	Few RSU activities attractive to donors. Donor funded projects may be peripheral to, and distract attention from, real purpose.

To date most staff time is from source (1), with operational costs of activities such as training courses and field support covered by (2). The VVOB[7] project is the major example of (3).

There are some emerging opportunities under (3) which will not be a distraction, which we intend to take advantage of. There is also scope for increasing funding from (2) particularly as projects proposals go through a more careful appraisal system. However the principle that much of the activity of the RSU is 'essential support' must be maintained if the unit is to meet its objectives. This may mean updating our overhead recovery policy.

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[7] For ILRI the Rockefeller funded training resource is the equivalent.

Appendix 5: Looking forward timetable (ILRI Biometrics Unit)

ACTIVITY	Expected starting or completion date
Inventory of other ILRI staff providing statistical support	By end December 2004
Data Management in collaboration with ICRAF SUGAR activities (quarterly)	As soon as possible 1st meetings in Addis, and Nairobi by December 2004
Biometrics Presentation – Annual Programme Planning in Addis Ababa	15-19/11/2004
Leaflet on roles of BU	By March 2005
Biometrics Training Materials on the web	By March 2005
Induction Training Course to graduate students in collaboration with ICRAF and University of Nairobi (BUCS)	1st course to start by March 2005
2004 biometrics training courses	Completed by end December 2004
2005 biometrics training courses	1st course by March 2005
Capacity strengthening of NARS collaborators-Resource pack	As soon as possible
Friday morning coffee by the Biometrics Unit Office	By December 2004
WAC Research Support Unit and ILRI Biometrics Unit joint activities. Focus on Data Management & Training Materials	As soon as possible
Needs assessment - survey	June 2005
Capacity strengthening of NARS collaborators: Dissemination of the Biometrics & Research Methods Training Resources	June 2005

Appendix 6: Archiving project level information

Why to archive?

- To enable individual researchers, members of the research team and, at some point, other users, easy access to a project's research products.
- To minimise dependence on individuals for access to detailed information about projects.
- To monitor project quality during the execution of the project.
- To be able to provide evidence about the quality standards achieved by the project.
- To use the archive as a resource for further research including adaptation of methods and use of data in integrated or meta-analysis.
- To fulfil obligations with research funding organisations.

When to archive?

Archiving should take place throughout the process of the research, "Live archiving". As soon as a research product (intermediate or final) is completed it should be added to the project archive. In general a condition for archiving is that the product is at its final stage of development. "Live archiving" will make archiving an easy task and could become a useful tool available to the project manager for quality control.

What to archive?

A project or activity archive should include:
1 Concept notes, project proposals, logical frameworks, terms of reference, or any other document that presents the case for the execution of the project.
2 Methodology documents including detailed description of all methods used for gathering information. For projects that use modelling tools or software that are not developed as part of the project work, a comprehensive description and references should be included.
3 Copies of all data collection instruments used. These may include among others: data recording sheets, questionnaires, standardised formats for recording results from PRA activities.
4 Raw data files including copies of completed standardised formats for recording results from PRA activities. Catalogues of relevant pictures, diagrams or photographs from research activities that generate information is not numerical or text.
5 Reports on data quality assessment including comments about areas where the evidence collected is strong and areas where there are weaknesses.
6 Data files used for analysis, syntax files used for data management, data cleaning and statistical analysis.
7 Every report prepared by the project. These should include the full set of technical reports, peer reviewed publications, briefings, etc.

How to archive?

There are multiple ways of organising information into an archive. The key characteristics of a good archive are that the information is complete and easy to access. In projects that use multiple methodologies and collect information of different types the use of web-based archives is an attractive option. An example of how to produce a web-based archive is presented in the CD attached.

ILRI already has a well developed intranet (ILRInet). In particular the "Manage Contents" and the "ILRI Groupware" facilities, provide an ideal framework for project level archiving. Project leaders need to realise how easy and useful it would be to build their own archives. The advantage of using "Manage Contents" is that anyone with access to it can easily create intranet pages linked and structured to make access to information intuitive. One possible limitation of ILRInet is that, as far as we were able to assess, it does allow for graded levels of access to information. You either give access or do not give access to pieces of information. However "ILRI Groupware" has facilities for different levels of access. Researchers should bear in mind that ILRInet can still be used to build project archives without making any (or part of) the information public. This means that a project manager can decide to make public some information and while keeping other private. For the purposes of project management, an archive should be kept even if none or only some of its components are available to the public. If 'live archiving' is properly done, when the time comes to go public, this should be possible at the touch of a button! Going public may mean making the information available on the intranet, the internet, CD, or other electronic media.

We see requirements for project level archiving as vital for IRLI's aim of assuring high standards in research quality. Other types of archives that allow easy searches and compilation of data are being explored by the institute; in particular the work commissioned to Peter Muraya from WAC should provide information about the next step after project level archiving. However while scientists wait for systems to be set in place to allow for more sophisticated archiving, simply keeping <u>all</u> information related to a project organised in a web-based archive will go a good part of the way. Any work done to get to this first level of organisation should help when a further step is taken.

A project archive as a monitoring tool

The process of archiving can be used as a monitoring tool if it happens as the project is developed. When a project manager uses a project tracking plan[8] the process of archiving will allow to check that:

- The research product is complete and the required standard of quality has been achieved.
- The research product has been delivered on time
- The development of subsequent activities is informed by the results that are already available.
- All research products expected to be produced by a project are completed and delivered to the project manager.

Archiving when working with partners

This may be more complex as partners may have the project management responsibility. However the Institute should ensure that as part of the collaboration agreement, ILRI takes part in the quality control process and can, at least, provide support for the archiving process (see section about quality in research).

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[8] See report on project "Characterising and assessing the benefits and risks of urban and peri-urban livestock production in Kampala"

Going public

When do you make a project archive public?

This depends on institutional policies and agreements with research partners and funding institutions. An important point is that the archive needs to be built as the project activities are completed and not when the data (and other information) is shared.

What data needs to be shared?

Full data bases are required if good use is to be made of the data. These databases should be accompanied with all the extra information that allows users to make sense of the data shared, sometimes called metadata (see "What to archive"). This will allow the user of the archive to make maximum and efficient use of the information available. However the shared data must comply with confidentiality and anonymity pledges made to information providers.
Sharing data must also take into account national legislation about what can be stored in electronic media (non-shared data must also comply with these types of regulations).
Some scientists are hesitant about sharing data because of concerns about others publishing papers before they are able to bring their papers out, because sharing data and methods shows the strong but also the weak aspects of any research process and sometimes because they feel possessive about the data. These concerns need to be addressed at an institutional level, and should not become an obstacle to archiving and sharing.

Description of the example attached

The CD contains the archive of a monitoring and evaluation programme (M&E) managed in Malawi by the Statistical Services Centre. The M&E involved a series of 17 nationwide studies carried that included work based on surveys, participatory approaches and case studies. The archive contains for each study the information described in "What to archive". It uses a series of HTML files to help navigating the documents.
We claim that anyone wishing to assess the quality of the research programme will find all the information needed on this CD. In fact all the information from the M&E programme is stored on this archive.