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IDRC Project File 100902-001

Improving Benefits of Urban and Peri-urban Livestock Production through Management of Associated Human and Environmental Health Risks in Nigeria

2003
Interim Technical Report
(Revised)

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2003 Interim Technical Report

Project Title: Improving benefits of urban and peri-urban livestock production through management of associated human and environmental health risks in Nigeria

Project File: 100902-001

Research Institution: International Livestock Research Institute (ILRI), in collaboration with the University of Ibadan (UI) and the National Livestock Project Division (NLPD)

Project Site: Ibadan and Kaduna, Nigeria

Reporting Period: 1 January – 31 December 2003

Date Submitted: 5 January 2005

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ILRI

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Total Budget: Can$ 684,920

Disbursed to Date: Can$ 281,630

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1. Synthesis

To ensure that livestock production and marketing activities can continue to provide livelihood opportunities for the urban and peri-urban poor, the Project seeks to generate information about human and environmental health risks associated with such activities in two Nigerian urban areas with contrasting biophysical and social contexts. This information will be used to design mitigation strategies and promote appropriate municipal policies. To achieve these objectives, the Project has adopted a multidisciplinary approach which incorporates participatory techniques, gender analysis and risk analysis to improve relevance and buy-in by key stakeholders.

During the reporting period of 2003, the Project was launched during a planning meeting held at ILRI-Ibadan in March. Research teams were formed to address the socio-economic, veterinary, human health, and natural resource components of the Project, and these teams then developed work plans. Preparations were undertaken for rapid appraisals and baseline household surveys to be conducted in both urban areas, which was to be the major activity scheduled for the first year. Study sites were selected and the questionnaire prepared, but data collection began only in late December in Ibadan. Agronomic trials were conducted in Kaduna to identify improved food-feed cropping strategies for intensive peri-urban crop-livestock systems, and trials to evaluate strategic feeding of fodder for urban dairy production were prepared. Due to a turn-over in ILRI staff, there was a major lapse in Project leadership, with increasing delays in implementing activities. Lack of appropriate technical backstopping was also contributing to a growing discrepancy between Project activities and objectives.

The present report, submitted in January 2005, is a revised version of the Interim Technical Report for 2003 originally submitted to IDRC in January 2004, in response to a recommendation of the Project review mission conducted by IDRC in July 2004.

2. Report Revision

An earlier version of the Interim Progress Report for 2003 was submitted to IDRC in January 2004. It was decided during the IDRC review mission in Ibadan in July 2004 that the Report merited revision to adhere better to the spirit of the IDRC reporting format, reflect the progress achieved during the reporting period and highlight the problems encountered. The Report has been revised accordingly. During the IDRC review mission in July 2004, significant changes to the implementation of the Project were proposed. These changes will

be discussed in the 2004 Interim Progress Report, and so are not presented here. The present Report limits itself strictly to the 2003 calendar year, documenting the status of the Project and the logic guiding its initiation and implementation. Problems that arose during this first year leading to the subsequent assessment during the July 2004 review are discussed.

3. The Research Problem

As elsewhere in the developing world, an ever-growing proportion of the population in Nigeria is living in cities. The associated growth in demand by urban populations for livestock products has created opportunities for the urban poor to develop livelihood strategies linked to livestock production and marketing activities directly within urban and peri-urban areas. Officially, municipal policies typically discourage such activities due to associated risks—both real and perceived—to human and environmental health, though in practice these activities often continue to be tolerated by municipal authorities. Improved information about the extent of the risks associated with urban livestock activities, and about possible measures to mitigate those risks, is needed to raise awareness and promote appropriate municipal policies, ultimately protecting and enhancing livestock-based livelihood strategies of the urban poor. The purpose of the Project is to generate the needed information and develop appropriate technological and policy options by engaging directly with the relevant stakeholders.

As presented in the approved Project proposal, the specific objectives are to:

- Determine the socio-cultural, environmental, economic and gender-related factors which promote urban and peri-urban livestock production systems, but which may also predispose producers and consumers to health hazards
- Assess the actual health risks associated with urban and peri-urban livestock production and impacts on different social and gender groups
- Evaluate the resource use and management practices associated with urban and peri-urban livestock production in order to assess impact on ecosystem health
- Develop technological options and identify policy measures to reduce the negative public health and environmental impacts of urban and peri-urban livestock production while improving the benefits
- Monitor and document in progress and final technical reports, the outputs and expected impacts of the Project.

The reporting period, 2003, represented the first year of the three-year Project, and was devoted to establishing Project management structures, developing workplans, and initiating fieldwork under the first and third objectives.

4. Research Findings

Being the first year of the Project, most activities were still in the planning or early implementation stages. Only certain field trials contributing to Objective 3 "Evaluating natural resource management practices associated with livestock production and their impact on ecosystem health" had been completed by the end of 2003 and had generated preliminary results. A key finding emerging from the trials in Kaduna to identify appropriate feed strategies to recommend is:

- In the Kaduna setting an intercropping strategy using maize and cowpea in a ratio of 2:4 was shown to provide higher combined yield of food for human use and feed for livestock feed than sole-cropping.

5. Project Implementation and Management

5.1 Schedule of activities

The original proposed timetable for Project activities is reproduced in Figure 1 below. Project activities during the reporting period (Year 1-2003) were to be largely devoted to Project start-up (establishing institutional arrangements and Project administration), development of workplans, design and implementation of baseline surveys, and design and initiation of public health and ecosystem studies.

A more detailed timeline of sub-activities actually implemented during 2003 is displayed in Figure 2. The following sections describe each of the implemented activities in more detail.

Figure 1: Original timetable for Project activities

Activity	2003 – Year 1				2004 – Year 2				2005 – Year 3			
	1st Q	2nd Q	3rd Q	4th Q	1st Q	2nd Q	3rd Q	4th Q	1st Q	2nd Q	3rd Q	4th Q
1. Stakeholders workshop (Obj 4)												
2. Socioeconomic and technical surveys (Obj 1, 2 & 3)												
3. Measuring public health risks (Obj 2)												
4. Ecosystem health studies (Obj 3)												
5. Synthesis of technical and policy analysis results (Obj 4)												
6. End-of-Project workshop (Obj 4)												

Figure 2: Actual timetable for Project activities

Activity	2003 – Year 1											
	J	F	M	A	M	J	J	A	S	O	N	D
0. Project administration												
0.1 Institutional arrangements												
0.1.1 Signing of contract with IDRC												
0.2 Planning Coordination Meetings												
0.2.1 Planning Meeting to develop workplans, 25-26/03												
1. Determinants of urban livestock production systems, and associated health and ecosystem risks (Obj 1)												
1.1 Ibadan baseline survey												
1.1.1 Survey design and site selection												
1.1.2 Data collection												
1.2 Kaduna baseline survey												
1.2.1 Survey design and site selection												
2. Assessing public health risks (Obj 2)												
2.1 Survey design and site selection												
3. Protecting ecosystem health (Obj 3)												
3.1 Characterize feed and waste management practices												
3.1.1 Prepare questionniare module												
3.2 Food-feed productivity trial (Kaduna)												
3.3 Strategic fodder feeding trials												
3.3.1 Produce fodder supplies (ILRI Ibadan)												
4. Devising technological and policy options (Obj 4)												
5. Monitoring and Documenting												
5.1 Planning Workshop report												

5.2 Activity 0 – Project administration

The Grant Agreement was finalized in January 2003, and signed by ILRI on January 30th.

ILRI convened a planning meeting at the ILRI-Ibadan office 25-26 March 2003 of the partner institutions and a number of other potential collaborators the Project sought to engage. In addition to researchers from the principal partners, the University of Ibadan (UI: Veterinary Department and University College Hospital), researchers from the Abeokuta University of Agriculture (UNAAB) and representatives from the Ministry of Agriculture and public health authorities from the study sites also attended. The objectives of the Project were presented, methodologies discussed, and the potential roles of collaborating individuals and institutions

identified. Members of the research team were grouped into four study teams around specific objectives (Socio-economics, Veterinary Public Health, Human Health, and Natural Resources) and were given the task of developing detailed work plans and budgets for every activity following the workshop. The workshop report is provided in Annex 1.

MoUs were to be established with the principal partner institutions, the University of Ibadan and the National Livestock Projects Division, but this was not achieved during the reporting period.

5.3 Activity 1 – Socio-economic Baseline Surveys

Purpose

The initial activity undertaken by the Project has involved a series of baseline surveys to characterise urban and peri-urban livestock activities and the socio-cultural, environmental, economic and gender-related factors that influence their development and associated risks. The results of these surveys would also serve as the basis for informing and finalising the design of the subsequent health, natural resource management, and policy studies under Activities 2, 3 and 4.

Activities undertaken

The remainder of the reporting period after the planning workshop in March was devoted primarily to preparing the surveys, including establishing city teams, selection of study sites, sampling and survey instrument design, and enumerator training. A first phase of rapid appraisals was conducted to sensitise key stakeholders and collect relevant information from secondary data or key informants. Consultations with stakeholders during this phase indicated that human and environmental health risks are not limited to livestock production alone but extend into primary and secondary processing of the products (blood, manure, hides, milk and meat) as well as consumption of products.

The rapid appraisals served to prepare the second phase, a questionnaire-based survey of a random sample of specific sub-populations of households. A questionnaire was developed to collect information on livestock production-dependent livelihoods in the urban and peri-urban areas, the threats to those livelihoods, division of labour at household level, the sharing of benefits, the health risks to which producers and livestock are exposed and feeding constraints faced by livestock producers (Appendix 3). The Socio-economic team was responsible for compiling, pre-testing and administering the questionnaire, which includes questions provided by the Human and Animal Health and Natural Resources teams. The same basic questionnaire was being used in both cities. During November and December 2003, Drs. de Haan and Okoruwa led the training of three field assistants in Ibadan and four enumerators in Kaduna in techniques for conducting socio-economic surveys. Implementation of the household survey began in Ibadan during the last week of the year.

Members of the Ibadan team (Drs. A.T.P. Ajuwape, H.O. Dada-Adegbola and N. C. de Haan) visited Kaduna on 21st – 22nd August 2003 to familiarize themselves with the study sites that had been pre-selected by the Kaduna team. At the end of the visit it was agreed that there was need for ILRI to conduct a workshop for the collaborators from both Ibadan and Kaduna sites on Participatory Rural Appraisal methods and questionnaire administration and analysis.

Ibadan

City Team: The socio-economic research team was led by Drs. de Haan (consultant, ILRI) and Okoruwa with the Oyo State Ministry of Agriculture and Natural Resources.

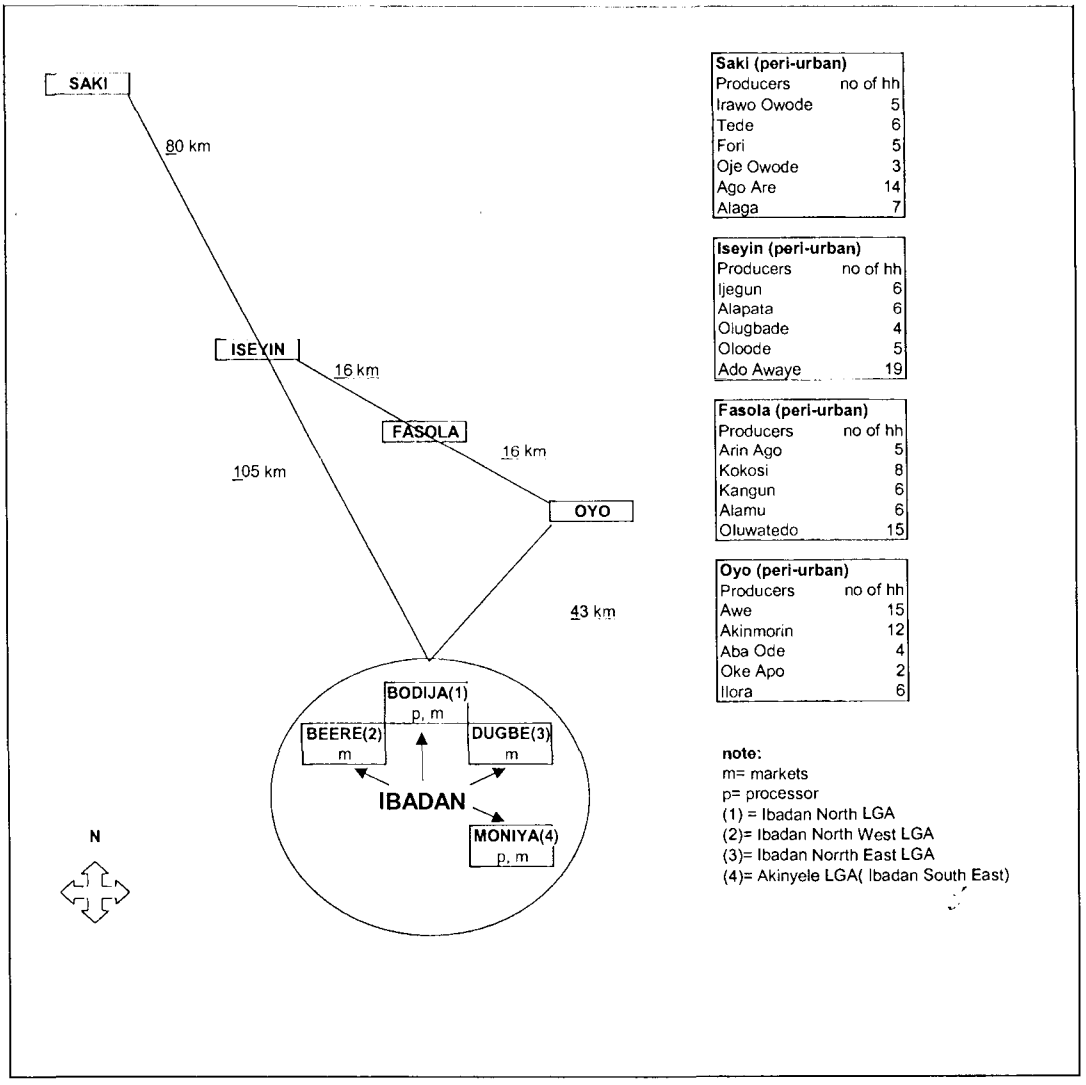
Site Selection: During the March planning workshop, four sites had been identified in the urban Ibadan area, and four sites in the peri-urban zone. A broad definition of "peri-urban" was adopted, which extended the peri-urban zone to smaller towns up to 100 km away that supply Ibadan city centre. The eight study sites identified were (Figure 3):

Urban	Peri-urban
(1) Bodija	(5) Fasola
(2) Beere	(6) Iseyin
(3) Dugbe	(7) Saki
(4) Moniya	(8) Oyo

Urban study sites for the survey were purposively selected based on their proximity to the hospital, observable environmental problems, and level of activities and accessibility. The four sites selected represent major markets for live animals and abattoirs.

Sampling Strategy for Household Surveys: In each of the eight sites, the household survey involves 40 households, for a total of 320 households. Respondents are to be selected randomly (i.e. every 3rd person) from a list of livestock owners compiled by the head of the

Figure 3: Project Sites and Sampling Distribution in Ibadan Urban and Peri-urban Area



community—the Fulani c[redacted]munity in the case of the peri-urban si[redacted] If there are 40 or less of such members per community, then all the community members on the list are to be interviewed. In 2004, there was also to be data collection from processors and traders of livestock products at four additional urban market sites.

Household Survey: The household surveys were initiated in the last week of December, and were expected to be completed in January 2004.

Kaduna

City Team: Following the planning workshop, a joint NLPD-State Ministry of Agriculture team under the leadership of Dr. Dangiwa was established in Kaduna, and included Dr. M. Tukur (Min. of Agric. Kaduna), Drs. M.A. Gana and Ishaq Bello (NLPD) and Alhaji Tukur Abashe (NGO).

Site Selection: The Kaduna team toured proposed sites for a week in early July (30 June-7 July) and obtained relevant information on producers, processors and markets in all the zones. The team found it useful to divide the Kaduna area into zones based on proximity to the city centre and direction, as depicted in Figure 4. The urban area is defined as being within 3 km of city centre, and the peri-urban zone between 3 and 5 km from the city centre. Four sites were selected for surveys, with one located in each of the four compass directions:

(1) Northern region around Refinery junction
(2) Eastern region around Namaigoro
(3) Southern region around Afaka
(4) Western region around National Eye centre

Rapid Appraisal: A total of 82 dairy herds were enumerated in the study sites initially, with 20-80 head of cattle per herd. Average milk yield of local cows is 2.5 l/d. In most herds, boys milk the cows, milk is processed on-farm, and consumers and traders obtain the milk directly from the producers. Some milk is also hawked by women.

During this phase, key stakeholders were contacted by official correspondence to inform them about the Project and solicit their participation. The list included:

- Ministry of Health, Kaduna State
- Kaduna State Environmental Protection Agency (KEPA)
- Kaduna State Urban & Property Development Agency (KASUPDA)
- Kaduna South Local Government
- Ministry of Agriculture, Kaduna State
- Miyetti Allah Cattle Rearers Association of Nigeria, Kaduna State chapter (NGO)

Proposed Sampling Strategy for Household Surveys: The sampling strategy was still being finalized.

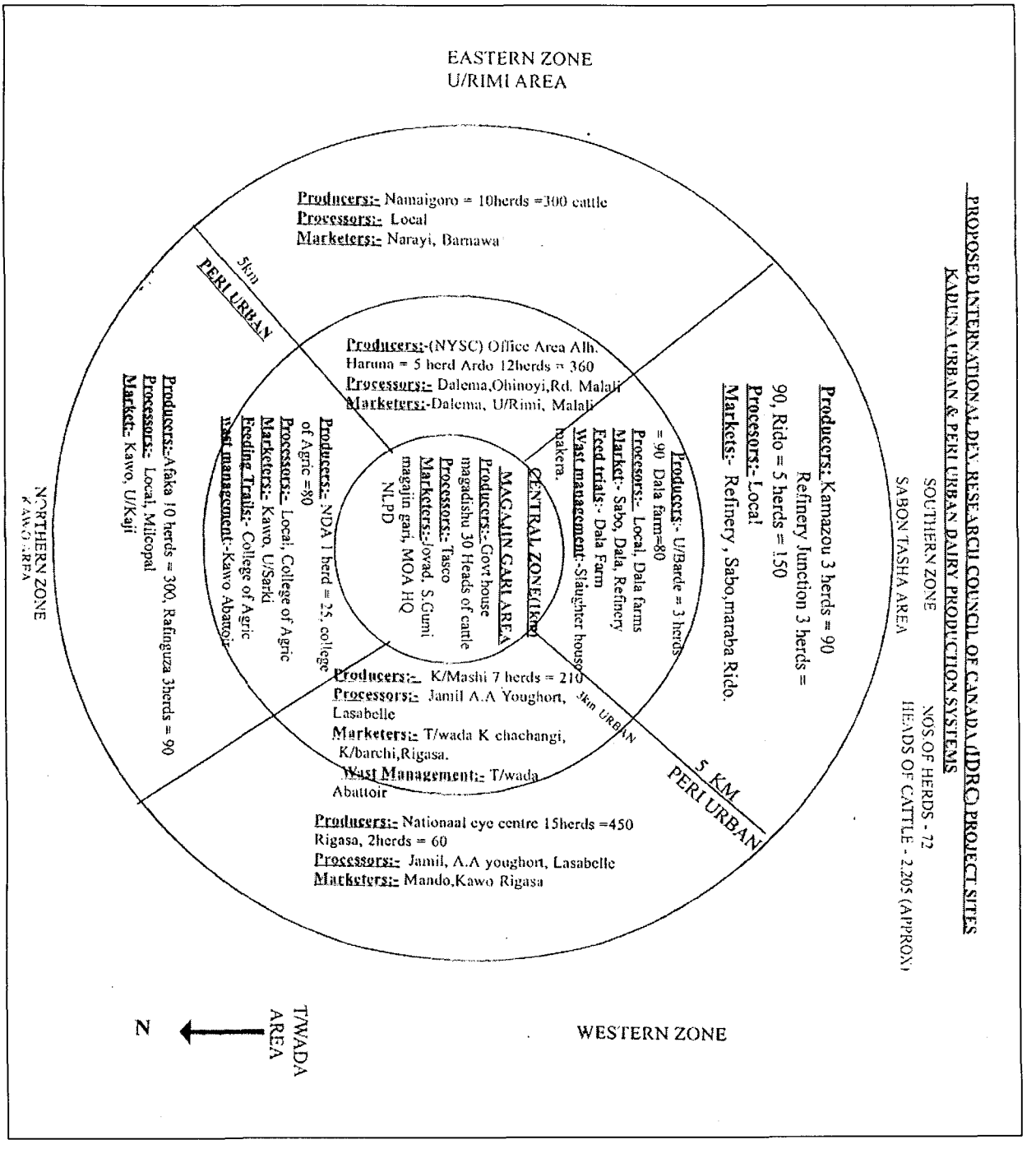
The Kaduna team recruited enumerators in August, who were subsequently trained in November. The household survey was scheduled to begin in February 2004.

5.4 Activity 2 – Assessing Health Risks

Purpose

Based on secondary data and information generated by the baseline surveys, veterinary and public health epidemiological studies will be designed using a HACCP framework and undertaken to characterize important human health risks associated with dairying and cattle

Figure 4: Study sites in Kaduna urban and peri-urban areas



marketing activities in urban and peri-urban areas, and how they impact specific sub-populations. The specific zoonotic diseases and contaminants to be investigated include bovine tuberculosis, brucellosis, *E. coli* O157, and antimicrobial residues applying the protocols detailed in the Project proposal. These studies will then serve as the basis for identifying strategies to mitigate such risks.

Activities undertaken

Following the March planning meeting, the veterinary and human health team members, who are all based in Ibadan, held several meetings to develop work plans and protocols. They also

planned for harmonising specimen collection, transportation and laboratory procedures. Approval of the Ethics Review Committee of the University of Ibadan/University College Hospital was sought. Informed consent forms for participants, from whom samples would be taken, were prepared.

5.5 Activity 3 – Protecting Ecosystem Health

Purpose

To mitigate risks to ecosystem health associated with urban livestock activities, the Project proposed focusing on devising and testing producer feed resource and waste management strategies adapted to the urban and peri-urban context.

Activities undertaken

As outlined in the Project proposal, the first year was to be devoted to baseline nutrition and natural resource management studies, involving: (i) characterization of current practices used by urban and peri-urban cattle keepers for managing feed resources and manure; and (ii) improving feed resource use by incorporating agro-industrial by-products that often can be found in or near urban areas. Work plans were developed soon after the March planning workshop, field activities were initiated, and a first set of trials was completed during the reporting period.

Characterising feed resource and waste management practices: A module of questions on feed and waste management was prepared for inclusion in the baseline questionnaire developed under Activity 1.

Improving feed resource use: Three main themes are being pursued.

- Better food-feed crop productivity. The Project is evaluating the use of food-feed crops developed during previous research in the context of emerging crop-livestock systems. The purpose is to address not only food needs (grain), but to also provide good quantity and quality fodder for livestock (and a potential destination for manure recycled into crop production). Previous studies had shown a good option to be a 2:4 cereal: legume row arrangement (compared to smallholder farmers' usual 1:1 row arrangement) with close plant spacing, using improved dual purpose varieties of cereals and legumes and judicious inputs (fertilizer only to cereal and insecticide only to legume in the case of cowpea). This technology can yield 12 tonnes of fodder on a 3.5 ha plot, or about 4 tonnes/ha. Agronomic trials were conducted on a commercial farm in Kaduna to optimize food and feed productivity using mixed maize and cowpea cropping strategies.
- Strategic use of fodder to improve milk production. Fodder supplies were produced at ILRI-Ibadan for use in on-farm feeding trials in 2004.
- Evaluating agro-industrial by-products. Information about current utilisation of by-products for livestock feed is being collected during the baseline surveys.

Improving waste management: Strategies will focus on nutrient partitioning to reduce urine waste and manure management options. Not yet started.

The methods used and results generated in the trials conducted in 2003 are reported in detail in Appendix 2.

5.6 Activity 4 – Devising Technology and Policy Options

Purpose

Drawing on the results from Activities 1-3, opportunities for improved technologies and potential policy options will be explored through participatory engagement of the relevant stakeholders.

Activities undertaken

This activity is scheduled to begin in the third year of the Project. However, the efforts made right from the start to directly involve key authorities and agencies in the Project during the March planning meeting, and then subsequently to inform and solicit the participation of key stakeholders in each of the study sites, have already begun to establish the needed engagement.

5.7 Activity 5 – Monitoring and Documentation

A report was prepared summarising the planning workshop held in March.

6. Project Outputs and Dissemination

As the Project is in its early stages, output during 2003 was limited to the intermediate output of a questionnaire instrument for characterising urban livestock production systems and livelihoods and their associated health risks, and a final output in the form of the food-feed cropping strategy evaluated by the agronomic trials in Kaduna. The 2:4 cowpea:maize cropping system was subsequently demonstrated on the IITA/ILRI Demonstration Farm in Kubwa, Abuja, FCT in November 2003. Other opportunities, such as Farmers Field Days, will be sought as vehicles for disseminating this strategy more widely.

7. Capacity-building

The Project will contribute to capacity-building in several ways.

- The individuals and institutions participating in the Project are expected to gain from exposure to, and experience in implementing, the approaches and tools being applied by the Project to assess risks to human and ecosystem health. During the reporting period, 4 enumerators in Kaduna and 3 field assistants in Ibadan were trained in survey techniques by Drs. de Haan and Okoruwa to prepare them to administer the baseline questionnaires. Team members have identified the need for additional training on participatory approaches as a priority.
- Some of the Project activities—particularly those related to the health risks—will be implemented by graduate students as their thesis research. Student candidates are still being identified by the university researchers.
- By adopting a participatory approach for the evaluation trials of best-bet strategies, a range of stakeholders will be directly trained, as well as knowledge generated by the Project being shared with policy makers and other key stakeholders. This form of capacity-building is anticipated for later stages of the Project.

8. Impact

The involvement of a wide range of stakeholders right from the start of the Project is expected to widen the reach of the outcomes of the Project. The participatory approach envisaged will greatly help in the communication of the results *in situ*.

All the stakeholders agree that the objectives of the Project are novel and the Project addresses a felt need that is repeatedly voiced, particularly in meetings with policy makers and municipal authorities. The main impact of the knowledge created by the Project will largely depend on how effectively it is communicated to the end users and to what extent its recommendation are implemented. Some of the issues might involve a policy change or better enforcement of existing laws. These issues are complex and often take long to implement due to the bureaucratic nature of government institutions responsible for such changes; the participatory approach, and more especially the strategy of directly involving representatives from the relevant agencies in Project activities, is intended to maximize ownership of the results and accelerate this policy change process.

9. Problems Encountered

Several problems emerged during the reporting period that threaten to hamper the effective implementation of the Project.

9.1 Turn-over of ILRI staff

In the second half of 2003, there was a complete turn-over in ILRI senior staff in Ibadan who were originally involved in implementing the Project. The original Project Leader, Dr. Williams, resigned from ILRI in October to take employment elsewhere. Dr. Larbi had resigned earlier in the year. The remaining turn-over was associated with a major internal re-structuring of ILRI's research programme, which led to the termination of Dr. Niezen's position, and the re-posting of Dr. Tarawali to ILRI-Ethiopia to head the new People, Livestock, and the Environment Theme. Dr. de Haan's consultancy contract ended in December. No ILRI senior staff was immediately posted to Ibadan as replacements. ILRI recruited Prof. Sonaiya of the University of Ife as a Visiting Scientist at ILRI-Ibadan to manage several on-going projects in the region, including the present Project. These staff changes had direct implications for the Project.

Leadership lapse: Dr. Williams left ILRI on October 31st and his Project Leader role was taken over on November 1st by Prof. Sonaiya. ILRI management failed to notify and consult IDRC about the change in Project leadership, as stipulated in the Memorandum of Grant Conditions, thus IDRC did not have an opportunity to assess the project leadership change. It became apparent the following year that these changes contributed to inadequate leadership for the project beginning in the second half of 2003. The Project research teams continued to pursue their individual activities, but the Project lacked effective conceptual coordination and backstopping.

Poor coordination: The individual research teams developed their work plans largely in isolation and viewed their activities as essentially isolated exercises. This resulted in a narrow disciplinary interpretation of their individual Project objectives, at the expense of the holistic approach outlined in the Project proposal.

Slowed implementation: Keeping such a diverse set of Project activities on track and on schedule requires constant supervision and backstopping. Lacking strong Project leadership, the development of work plans and their implementation were considerably delayed. As a result, Project activities are well behind schedule and the Project budget has been largely underspent during 2003.

9.2 Divergence from IDRC programme objectives and lack of backstopping in critical areas

Consistent with IDRC programme objectives, the Project proposal had highlighted the use of a participatory and gender analysis approaches within a HACCP framework to address human and ecosystem health risks associated with urban and peri-urban livestock activities. However, the Project team has little or no experience in the critical areas of participatory and gender analysis approaches, risk analysis techniques, ecosystem health concepts, and urban agriculture issues. The Project was meant to develop the needed capacity in each of these areas. However, no measures were taken during the reporting period to provide the needed backstopping in these areas (the training in participatory approaches by Dr. de Haan was limited to their use in developing the baseline questionnaire and its administration, rather than how they could better inform the overall design and process adopted by the Project). As a result, it is not evident that the activities undertaken are serving the objectives defined in the Project proposal appropriately. A number of these inconsistencies were recognised by both ILRI and IDRC staff when the Interim Technical Report was submitted in January 2004, and were subsequently addressed during the IDRC review mission in July 2004.

10. Recommendations

The Project was initiated effectively during the planning workshop in March 2003, but a major lapse in ILRI leadership and oversight has contributed to poor subsequent implementation. Although the Nigerian research teams continued to pursue their activities, these activities have not been effectively coordinated and strategically backstopped. While some progress has been achieved, the Project is now well behind schedule and is pursuing certain activities of questionable relevance to the spirit of the objectives as described in the proposal.

In view of this situation, it is recommended that IDRC and ILRI work together to ensure:

- Stable leadership and oversight is established
- Appropriate technical backstopping is provided to the research team in participatory and gender analysis approaches, risk analysis techniques, urban agriculture issues, and ecosystem health considerations
- Project activities are re-oriented as needed for better consistency between Project activities and IDRC programme objectives
- Work plans and budget are revised accordingly to complete activities within the Project period.

The IDRC review mission in July 2004 provided the basis for implementing these recommendations.

Appendix 1

Report of the Work Planning Meeting for the IDRC-funded Project:

"Improving benefits of urban and peri-urban livestock production through management of associated human and environmental health risks in Nigeria"

25-26 March, 2003

ILRI Conference Room,

International Institute of Tropical Agriculture (IITA)

Ibadan, Nigeria

Session 1

Opening and welcome address

Dr. Tim Williams welcomed the participants and gave a brief outlay of the project objectives and purpose of the workshop. According to him, urban livestock production is growing in West Africa. The situation in Nigeria depicts the picture in other West African countries and if the proposed project becomes successful there are lessons that could be extended to other countries in West Africa and other parts of Africa. He also outlined the structure of presentation for the three main objectives of the study to include: study sites, activities to be implemented, methodologies, calendar of activities, training, ethical considerations, and budget

Session 2

2.1 *Socio-economic surveys*

Dr. Williams presented *"Socio-economic surveys"* aimed at determining the socio-cultural, environmental, economic and gender related factors which promote urban and peri-urban livestock production systems, but which may also predispose producers and consumers to health hazards.

Key issues raised during the discussions included:

- The need for detailed explanation of the stratified sampling approach
- Possible interaction and linkages between activities.
- Timing of the participatory surveys.

2.2 *Collaborative roles of participating institutions*

The participating institutions outlined their possible roles in the implementation of the project. Outcome of the discussions that followed the presentations is presented in Table 1.

Issues raised during discussion included:

- The need to identification and agree on survey sites
- The need for the various teams to provide aspects of their work that needs be incorporated in the survey instruments.
- The need to have copies of the statutory regulations put in place by the states and/or local government to serve as guide while carrying out the work.
- Presentations by representatives of Oyo state Ministry of Agric. and Akinyele L.G.A. should be harmonized to show areas of complementarities with the project
- Sites and resource persons from Kaduna State should be included in the human health survey.

Table A-1: Areas of collaboration by participating institutions

Institution	Area of collaboration/ assessment
Veterinary team (University of Ibadan and University of Agriculture, Abeokuta)	• Microbial contamination of meat samples • Incidence of 3 major zoonotic diseases: tuberculosis, E. coil, brucellosis) • Assessment of antibiotic residues in meat and milk products
Human medical team (University College Hospital)	• Retrospective outlook of medical records from secondary and tertiary medical centers • Surveys of producers and consumers to identify carriers of any of the 3 zoonotic diseases at the commencement of study and subsequently at 6 months interval over a period of 18 months • Relate identified cases of diseases with urban and peri-urban farming activities
National Livestock Projects Division (Kaduna)[1]	• Identifying resource persons, participants and sites where survey will be conducted • Participate in survey work, data analysis and report writing
Ministry of Agriculture (Kaduna State)	• Identification of agencies and survey sites • Provide logistics for accessing sites and target population
Public health authorities (Akinyele Local Government Area)	• Environmental degradation issues (e.g. pollution, refuse disposal, and hygiene) within and around abattoirs • Legislative issues (providing public health laws and by-laws) • Occupational health and hazard issues (public safety and effects on environmental management)
Ministry of Agriculture (Oyo state)	• Identification of farmers and markets • Assessment of abattoirs, and methods of meat production and processing • Assessment of drug sale and administration at cattle markets • Water pollution - use of water resources for human and livestock • Waste management

Session 3

3.1 ***Epidemiology surveys***

The Epidemiology team (E.B. Otesile, A.T.P., Ajuwape, M.A., Dipeolu, from UI/UNAAB) presented "*Epidemiology surveys*" aimed at assessing the actual health risks associated with urban and peri-urban livestock production and impacts on different gender and social groups. The presentation focused on type of data to be collected, laboratory analysis, and data analysis and interpretation.

Major issues and conclusions during the discussion were:

- Blood serum will be screen for brucellosis while milk samples will be screened for organic residues.
- The team will prepare a draft of detailed work plan for activities to be implemented in Ibadan and Kaduna. The workplan will then be circulated for comments.
- Resource persons from the National Livestock Project Division and Ministry of Agriculture in Kaduna State will be involved in the field surveys.
- Blood and milk samples will be analysed at the same laboratory or place to reduce cost and possible manipulation (falsification) of results.

3.2 ***Assessment of health risks association with livestock production***

The Human Health team (K.S., Akinlade, H.O., Dada-Adegbola and E.T., Owoaje from UCH) presented "*Assessment of health risks association with urban and peri-urban livestock production in Southwest Nigeria*". The presentation focused on: study sites, study population and size to be sampled, sampling techniques, data collection process, laboratory investigations, data management procedure and ethics to be consider in the course of study. The activities to be undertaken will complement that of the epidemiological surveys.

Key issues raised during discussions included:

- The need to harmonize the human and veterinary public health issues and methodologies to avoid duplication.
- The use of retrospective health data may not be needed.
- The human health should establish in contacts in Kaduna to enhance implementation of the activities.
- Survey instrument should be developed and shared with the different teams in order to ensure that all grounds are covered.
- The need to seek the consent of respondents in the collection of data.
- Leaders of target population should be well informed and carried along in all aspects of the project in order to gain their support and get their people involved.
- Samples should be collected along the production chain - from production to consumption points.
- The need to target the community instead of individuals in the provision of incentives, thus eliminating the problem of equity share.

- Delineation of the enumeration sites and sampling should take into consideration the calendar of activities.
- Study sites were selected based on proximity to the hospital, observable environmental problems, and level of activities in the market and accessibility.
- Study sites selected for the southwest included Isehin, Shaki, Fasola and Oyo.
- Markets to be visited include:
    - Bodija — Ibadan North L.G.A.
    - Akinyele — Akinyele L.G.A.
    - Aleshinloye — Ibadan Southwest L.G.A.
    - Oje — Ibadan Southeast L.G.A.

Session 4

4.1 ***Baseline surveys***

Dr. Niezen presented "*Baseline Surveys*" on behalf of the Resource Management team (J. Niezen, S., Tarawali, A. Larbi, and T. Williams from ILRI). The objective of the work on resource management is to improve resource use and management practice associated with peri-urban ruminant livestock production in order to reduce negative impacts on ecosystem health. The presentation focused on feed resource availability and use, agro-industrial by-products, feeding practices, husbandry practices, health care, feeding systems, and manure management.

Issues raised included:

- Streamlining of the field survey to fit in the calendar of other teams especially by adopting the proposed HACCP method.
- The activities should focus on semi-intensive livestock production systems, and address environmental issues such as waste management along the production to consumption chain.
- Smallholder farmers should be the target group.
- Work plans should be sent to ILRI on or before 8th April for circulation and comments. Comments and suggestions should be returned to Team Leaders by April 15.
- A group was formed to oversee the socio-economic surveys. It consisted of representatives from the epidemiology, human health and resource management) teams.

4.2 ***On-farm and on-station feeding strategies***

The environmental management team presented *"On-farm and on-station feeding strategies"*. The presentation, which was in two parts focused on:

- Developing agronomic practices to reduce environmental health risks associated with urban and peri-urban livestock production, and
- Feeding strategies to ensure efficient nutrient capture reduce environmental risks in urban and peri-urban livestock production systems.

It was agreed during the discussion that:

- Cowpea should be included among crops to be used for the on-farm and on-station trials.
- The agronomic and feeding studies should be linked, i.e. forages the agronomic experiments could be fed to livestock and the manure from animals used for soil fertility improvement.
- The human health and epidemiology group could play a role by monitoring at soil contamination and possible water pollution.

4.3 ***Logistics of project***

Dr. A. Larbi led the discussion, which focused on budget, calendar for activities, and training. It was agreed that:

- Disbursement of funds should be based on the level of activities.
- Governments of the two states covered by the project should be approached to assist with additional funding.
- It was suggested that a "CHAM" equipment should be purchased to aid analysis.
- Graduate students would be used for most of the activities outlined.
- Training workshop would be organized for staff from the ministries, local governments, producers, and consumers on urban livestock production and environmental health risk.
- Federal and state ministries of health, information, environment and agriculture, and science and technology be informed about the project and explore the possibilities for additional funding.
- Project activities are expected to start in May 2003
- Calendar of activities identified by teams (Table 2)
- The project will handle the number of patients that the current budget can carry. If more patients are needed, possibilities of linking up with foundations such as DAMIEN which presently offers free treatment for tuberculosis will be explored.
- Resources, potential project sites and stakeholders for the implementation of the surveys in Kaduna were discussed. Outcome of the discussions included:
- *National Livestock Project Division:* Federation of Milk Producers Association, 40 dairy cooperative associations with total membership of about 2000 farmers, dairy processing plants, list of commercial dairy farms around Kaduna, and professional - rural sociologist, agricultural economist, and veterinarians.
- Ministry of Agriculture and Environment: See Table 3

Table A-2: Calendar of [redacted]vities

Team	Activities
Veterinary (Epidemiology)	• Field work to be competed in two years • Sample collection and laboratory analysis/ work done concurrently • Field survey information incorporated into socio-economic survey instrument
Human Health	• To commence with survey work done alongside the socio-economic team • Clinical and laboratory work to start concurrently after the survey work
Natural Resource Management	• April/June 2003 baseline survey • June -September

Table 3. Suggested sites and available resource for the implementation of surveys in Kaduna State.

Zone/Site	Sites	Resources
Eastern	Ungo Rimi	• Traditional producers • Veterinary clinic (1) • Livestock technicians (6)
Southern	Sabo Tasha, Kaswa Magani	• Traditional producers • Dala Farms • Veterinary clinic (1) • Veterinary officer (1) • Livestock technicians (2)
Western	Tudu Wada, Nwuja	• Traditional producers • Commercial producers • Cattle market • Abattoir (1) • Veterinary clinic (1) • Veterinary doctor (1) • Livestock technicians (1)
Central	Sabo Gari	• Veterinary clinic (1) • Veterinary doctors (6) • Livestock technicians (6)
Northern	Kawo, Rigachikum	• Smallscale producers • Abattoir (1) • Dairy plant (1)

Annex 1-1. Programme for Work Planning Meeting for the IDRC funded project "Improving benefits of urban and peri-urban livestock production through management of associated human and environmental health risks in Nigeria" 25 - 26 March 2003, ILRI Conference Room, Ibadan, Nigeria

Tuesday 25 March

Time	Activity
08:00	Registration
	Welcome and opening Chair: J Niezen, ILRI-West Africa, Ibadan Rapporteur: V Okoruwa, ILRI-West Africa, Ibadan
0900	Welcome and introduction – A Larbi, ILRI-West Africa
0910	Background and objectives of the meeting – T Williams, ILRI-West Africa,
0920	Discussion
0935	Group Photograph
	Session 1: Workplans to achieve objective 1. *Determine the socio-cultural, environmental, economic and gender related factors which promote urban and peri-urban livestock production systems, but which may also predispose producers and consumers to health hazards* Chair: E B Otesile, UNAAB, Abeokuta Rapporteur: V Okoruwa, ILRI-West Africa
0940	Socio-economic surveys – T Williams
1010	Discussion Roles of collaborating institutions (preliminary views) • UI/UNNAB/UCH - EB Otesile, ATP Ajuwape, MADipelou, K Akinlade • NLPD - A Gana, T Ibrahim • Akinyele Local Government Authority - TO Oyewole, T Adisa • Kaduna South Local Government Authority - T Mustapha, I Dangiwa • Oyo State Ministry of Agriculture and Natural Resources - I Kolajo & B Taiwo
1030	Coffee Break
	Session 2: Workplans to achieve objective 2. *Assessment of actual health risks associated with urban and peri-urban livestock production and impacts on different gender and social groups* Chair: O B Kasali, Tuskegee University, Alabama, USA Rapporteur: V Okoruwa, ILRI-West Africa
1100	Epidemiological surveys - including risk analysis: EB Otesile, ATP Ajuwape, MA Dipelou, UNNAB, UI
1145	Discussion
1200	Human health aspects - including risk analysis: K Akinlade, E Owoaje, NO Dada-Adegbola, UCH, Ibadan
1230	Discussion
1300	Lunch
1430	Roles of collaborating institutions (preliminary views) • NLPD - A Gana, T Ibrahim • Akinyele Local Government Authority -TO Oyewole, T Adisa • Kaduna South Local Government Authority -T Mustapha, I Dangiwa • Oyo State Ministry of Agriculture and Natural Resources - I Kolajo, B Taiwo

Session 3: Work plans to achieve objective 3. *To improve resource use and management practice associated with peri-urban ruminant livestock production in order to reduce negative impacts on ecosystems health*
Chair: T Williams, ILRI-West Africa, Ibadan
Rapporteur: V Okoruwa, ILRI-West Africa, Ibadan

1500	Baseline surveys: J Niezen, S Tarawali, A Larbi, ILRI-West Africa
1515	Discussion
1530	Coffee/tea break
1600	Stream-lining baseline surveys: including socio-economic, epidemiological, human health, feed resources and natural resource management
1640	Closing

Wednesday 26 March

11. Session 3: Work plans to achieve objective 3 (continued)
Chair: K Akinlade, UCH, Ibadan
Rapporteur: V Okoruwa, ILRI-West Africa

0830	On-farm and on-station feeding strategies: J Niezen, S. Tarawali, A. Larbi, ILRI-West Africa
0900	Discussion
0930	On-farm and on-station crop management/bioremediation: S Tarawali, A. Larbi, ILRI-West Africa
1000	Discussion Roles of collaborating institutions • UI/UNNAB/UCH - EB Otesile, ATP Ajuwape, MADipelou, K Akinlade • NLPD - A Gana, T Ibrahim • Akinyele Local Government Authority - TO Oyewole, T Adisa • Kaduna South Local Government Authority - T Mustapha, I Dangiwa • Oyo State Ministry of Agriculture and Natural Resources - I Kolajo, B Taiwo
1030	Coffee/tea break

Session 4: Project logistics
Chair: A Larbi, ILRI-West Africa
Rapporteur: V Okoruwa, ILRI-West Africa

1100	Roles of collaborating institutions to achieve objectives 4 and 5, and logistics: T Williams, ILRI-West Africa • Work plans • Progress reports • Budgets • Training
1200	General discussion
1230	Closing

Annex 1-2. List of participants for the Work Planning Meeting for the IDRC-funded project "Improving benefits of urban and peri-urban livestock production through management of associated human and environmental health risks in Nigeria" 25 - 26 March 2003, ILRI Conference Room, Ibadan, Nigeria

	Name	Addresses
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4	Dr. Cadmus Idowu	Department of Veterinary Public Health and Preventive Medicine University of Ibadan, Ibadan, Nigeria Tel: 09-8106747, 08023060510 Email: sibcadmus@yahoo.com
5	Mr. Adisa Toyin	Dept. of Disease Control & Env. Services Akinyele Local Government Moniya, Ibadan Tel: 08034038428 Email: abitoyus@yahoo.co.uk
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7	Dr (Mrs) Dipeolu Morenike	College of Veterinary Medicine University of Agriculture (UNAAB), PMB 2240, Abeokuta, Ogun State, Nigeria Tel: 08033444258 Email: olulase@yahoo.com
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		Phone: 062:310982, 316011 Email: mohdgana@yahoo.com
11	Dr. Tukur Mustapha	Ministry of Agriculture Area Veterinary Office PMB 2103, Kaduna Tel: 08037867910 Email: tktukur@yahoo.com
12	Dr. Dangiwa Ishaya	Ministry of Agriculture PMB 2103, Kaduna Phone: 08044134365, 062: 218699
13	Mr. Ibrahim Tijjani	National Livestock Projects Division (NLDP) 9 Gowon Way PMB 2222, Kaduna Tel: 062-249295, 244421, 080-34053178 Email: nlpd2000@yahoo.com
14	Dr (Mrs) Owoaje Eme	Dept. of Community Medicine UCH/College of Medicine University of Ibadan Tel: 02- 8100698, 2411590
15	Dr (Mrs) Dada-Adegbola Hannah O.	Dept. of Med. Microbiology and Parasitology UCH/College of Medicine University of Ibadan, Nigeria Tel: 08034080898, 02-2410088 ext. 2721 Email: hoadegbola@hotmail.com
16	De Haan Nicoline	International Institute of Tropical Agriculture (IITA) P.M.B. 5320, Ibadan **Tel: +234 2 2412626** Fax:+234 2 2412221 Email: n.dehaan@cgiar.org

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PROGRESS REPORT - Objective # 3

To evaluate the resource use and management practices associated with urban and peri-urban livestock production in order to assess impact on ecosystem health

Principal Investigators:

Asamoah Larbi (ILRI, Nigeria)[1], Tim Williams (ILRI, Nigeria)[1], Shirley Tarawali (ILRI, Nigeria), Leo Nyam (NLPD, Kaduna), (Dala Farms, Kaduna), Akim Alimi (ILRI, Zaria), Abu Musa (ILRI, Kano),

Introduction:

The main aim of studies undertaken in the context of this objective is to develop together with farmers, improved options for the management of natural resources, balancing strategies to enhance livestock production with those that ensure positive effects on agroecosystem health. During the present period, activities have focused on understanding livestock producers' current options, opportunities and constraints and on developing options for feeding and resource management studies with farmers.

Implemented Work Programme

During 2003, activities have focused on two aspects germane to this aim. The first relates to objective one of the overall project, and entails surveys to identify livestock producers' major sources of feed, their ruminant management strategies, and manure utilization practices. Questions relating to these aspects were included with surveys implemented with producers in Kaduna and Ibadan during the latter part of 2003. The surveys also included assessment of the use and availability of agro-industrial by-products. The second focus of activities has been on developing potential options for feeding and resource management studies with farmers. The approaches used here varied according to the circumstances in the two project locations

In Kaduna a peri-urban, large scale farmer participated in project activities together with NLPD staff and ILRI research staff based in the region. About 5 ha of land was allocated to grow improved dual purpose crop varieties, with the intention of using these as a resource for dry season feeding of the farmer's lactating cows. The crop varieties and management options were derived from earlier on-farm and on-station trials implemented by ILRI and other partners in the northern Guinea savanna of Nigeria. In the present instance, part of the allocated land was planted using this approach, but in addition, some sole crop cowpea and sole crop maize were also planted. The latter strategy was intended to take account of the mechanization available on such a commercial farm, which could more readily be used for sole crops, as opposed to the intercrop pattern which works very well for manual labour, but is not amenable, for example, to the use of a boom-sprayer for herbicide application.

Crop establishment, assessment and management were as follows. 2:4 maize: cowpea was established at the beginning of the 2003 rainy season. Maize variety ACR97, a late maturing variety with potential for dual purpose use, cowpea variety IT93K-452-1, which is an early

[1] Left ILRI Nigeria during 2003.

maturing variety that was harvested and a late maturing fodder variety of cowpea (IT89KD-288) planted for the latter part of the growing season, were used. Fertilizer was applied as a blanket dose over the whole field of 100 kg/ha compound NPK (15:15:15) followed by 50 kg/ha N as urea to the maize only 6 weeks later. Cowpea was sprayed for post-flowering insect pests at flowering and podding, using Delfos and Sherpa-plus. Manual labour was used to keep the plots weeded. The early cowpea was harvested in early September, and the second cowpea crop planted 3-4 weeks later. At harvest time, five 5m*5m quadrats were marked out per hectare to sample the grain and fodder yields of both maize and cowpea. Subsamples of grain and fodder were taken for dry matter determination and used to estimate the dry matter yield. In addition, total grain and fodder yields were assessed, the latter being particularly important to assess the fodder available for dry season feeding

Sole cowpea and maize plots were established and managed using the same levels of fertilizer and insecticide, but with the use of herbicide applied with a boom sprayer rather than manual weeding for weed control. Maize grain yields from the 2:4 intercropped fields averaged 2671 kg/ha, with 5574 kg/ha stover. From the same fields, cowpea grain yield was estimated as 701 kg/ha with 1525 kg/ha fodder from the early season cowpea. Sole crop cowpea yields were estimated to be 668 kg/ha grain and 1208 kg/ha fodder. Sole crop maize yields averaged 3482kg/ha with 7265kg/ha stover. Late season cowpea was not harvested but grazed. Estimated actual fodder availability is 11,908kg from the 3.5ha.

Discussions with the participating farmer and the farm manager were also positive, in particular their impressions of the improved fodder availability from the approaches used. They saw this as particularly valuable because usually such inputs have to be purchased and there are no fodder resources generated from their crop fields. The introduction of approaches to improve food and feed production developed with small scale farmers to a larger, commercial scale farmer provided some important learning experiences and comparisons, in particular the use of sole and intercropped plots and the potential for using mechanisation, in particular for weed control.

In Ibadan a different approach was used, in order to complement and build upon information from the livestock producers' surveys. As a prelude to information from the surveys, plots were established on station on the IITA campus in Ibadan to generate fodder for potential dry season feeding trials with producers. A land area of 1.44ha was prepared for cowpea fodder establishment and 1.25ha was prepared for Pennisetum purpureum. Maize was not planted as the Maize program in IITA agreed to provide maize stover from their harvest. Cowpea was planted on the 11th and 12th of September and P.purpureum on the 15th, 16th and 17th of September. Pre and post emergence herbicides were applied to cowpea plots on the 12th of September and to P.purpureum plots on the 17th of September. Insects attack on cowpea leaves was first observed on the 10th of October and insecticide was sprayed on the 14th of September when the attack was severe. Urea was applied to the P. purpureum plots at the rate of 100kg/ha two weeks after planting i.e. 2nd of October to improve tillering. The plots were irrigated on a regular basis from October. Cowpea and maize fodder were cut, left to wilt and then packed into the animal nutrition farm for storage in the first two weeks of January, 2004. The P.purpureum is still standing on the field as it is to be cut green for on-farm feeding trails. These feed materials are now available for use in on-farm feeding trials which are currently being developed using a combination of information from the producers' surveys, previous information from feeding trials, and farmer discussions.

The cowpea variety 1789KD-288 was used and was harvested by cutting before grains were produced. Cowpea fodder yield was 1775kg/ha. Maize variety TZL COMP.$3C_3$ was also harvested green before cobs were formed. Maize stover yield was 2450kg/ha.

Outputs

- Production of fodder for use in strategic on-farm feeding of lactating dairy cows in Kaduna
- Establishment of working partnership with commercial farmer, NLPD and ILRI in Kaduna (already there has been interest from neighbouring farms, so this could be seen as a demonstration that will enable other farmers to subsequently join in)
- Information enabling comparisons and strategies for small and large scale farmers to improve food and feed production in Kaduna peri urban areas

Products and Technology Transferred

- Use of improved dual purpose varieties and management options for food and feed production evaluated by one commercial farmer in Kaduna

Training

No training implemented in the context of this work period

Expected Implications of Outputs and Achievements

Specific outputs in terms of the fodder produced in Kaduna and Ibadan will enable feeding and nutrient management trials with farmers to be initiated during the dry season in both locations.

Information from the surveys will also contribute to the design and implementation of the feeding trials, because available supplements will be identified and included as options.

Problems

The departure from ILRI of two key members of the project team slowed progress during 2003. Nevertheless, through ensuring activities commenced, a good footing has been established for implementation of activities to address this objective during 2004. The involvement of students from local institutions is also being explored as part of the project collaboration.

Collaborators

Leo Nyam, NLPD, Kaduna, Nigeria
Dala Farms, Kaduna, Nigeria

Appendix 3

QUESTIONNAIRE FOR PUBLIC AND AGROECOSYSTEM HEALTH RISK ASSESSMENT OF PERI-URBAN LIVESTOCK PRODUCTION

Target Respondents: Livestock Producers

Section 1: Socio-economics

A. General Information

1. Date of interview _____(day/month/year). 2. Questionnaire no. _____

3. Location_____(Oyo/Kaduna State). 4. Survey site_____

5. Name of enumerator _____

6. Name of respondent_____ 7. Age_____ (years).

8. Sex_____(male/female). 9. Ethnicity_____

10. Marital status_____(1=married, 2=divorced, 3=widowed, 4=single)

11. Religion _____(1=Christianity, 2=Islam, 3=traditional, 4=others (specify: _____)

12. Occupation: primary_____, secondary_____, others (specify: _____)
(e.g., farmer, crop farmer, livestock farmer, trader etc.)

B. Household Characteristics

13. Could you please provide us with some information on the members which make up your household?

No	Household Members (starting with respondent)	Status in the household (1=husband, 2=wife, 3=son, 4=daughter, 5=relative)	Age (years)	Education (1=none, 2=Arabic, 3=primary, 4=secondary, 5=tertiary)
	Males			
	Females			

14. What are the households tasks performed by the women in the household?
(e.g. cooking, milking, water fetching, farming, etc.)

Task	Number and duration of tasks			
	Adults ≥ 15	Duration of task per day in hrs.	Children < 15	Duration of task per day in hrs.

15. What are the households tasks performed by the men in the household?
(e.g. herding, milking, water fetching, farming, repairing the house, etc.)

Task	Number and duration of tasks			
	Adults ≥ 15	Duration of task per day in hrs.	Children < 15	Duration of task per day in hrs.

C. Production

16. Could you tell us something about the composition of your herd?

Livestock species	Number of animals owned by								No. of animals kept in care for other people
	Husband	Wife			Other adults		Children		
		1	2	3	Male	Female	Male	Female	
Cows (3 years and above)									
Bulls (3 years and above)									
Young cows/heifers (1-2 years)									
Bulls (1-2 years)									
Male calves (0 to <1 year)									
Female calves (0 to <1 year)									
Male sheep									
Female sheep									
Male goats									
Female goats									
Poultry (chicken and guinea fowl)									
Pigs									
Camels									
Donkeys									
Horses									
Dogs									
Cats									
Others (specify)									

17. Do you grow crops? _____ *Yes* _____*No If yes, go to Q 18, but if no, go to Q19.*

18. Could you please give us some information about your farm?

Farm plot	Distance from homestead (km) or in minutes?	Size (ha) or local units - please identify which	Current status (1= croppe d, 0= fallow)	No. of years in fallow	Crops grown (1 = sorghum, 2 = millet, 3=maize, 4=cowpea, 5=yam 6=groundnuts, 7=cassava; 8 = rice, 9=soybean, 10=others (specify: _____)	System of planting (1=sole, 2=mixed) *	Yield of crops per plot (in kg or local measures of farmers) last year **	Land tenure (1 = inherited , 2 = purchased 3 = lease, 4 = others (specify:___ _____)	Who makes decision what is planted (1=husban d, 2=wife, 3= adult male, 4= adult female)	If farmed by women do they have (1=right of ownership, 2=only right of continuous use 3=only right for temporary (annual) use)
A										
B										
C										
D										
E										
F										

* Note: plots with sole crop should be differentiated from plots with crop mixtures

** Ask separately for the yield of each crop in a mixture and use a slash (/) to demarcate the figures from each other.

D. Farm and Labour Activities

19. How many household members do farm work? _____

20. Do you employ the services of other labour to do your farm work (hired or exchange)? _____ Yes _____No If yes, go to 21, if no, go to Q 23.

21. If yes, why do you employ them? _____

_____

_____

22. What type of labour do you use for the following farming activities and how long do they spend working on a typical day?

Farm activity	Labour type*	Number used	Duration (hrs/day)	Time of the year this type of labour is used	Does any one else of the household assist you (but is not hired)? (1=Yes**, 2=No)	**If yes, specify and give details
Herding						
By-product feeding						
Cut and carry feeding						
Kraal clearing/ collecting manure						
Livestock produce						
Milking						
Milk processing						
Milk and milk product marketing						
Livestock marketing						
Land management						
Land clearing						
Ridge making						
Weeding						
Fertilizer/ manure application						
Chemical spraying						
Harvesting						

*Specification of labour type (1 = adult male ≥ 15yrs, 2 = hired adult male ≥ 15 yrs., 3 = adult female ≥ 15yrs, 4 = hired adult female ≥15 yrs., 5 = male children < 15yrs, 6 = hired male children, 7 = female children < 15yrs, 8 = hired female children)

**Note: details will include labour type, number, duration and period of the year used.

E. Production and Marketing

23. Could you give the average milk yield by production period in the last 12 months (litres/day)? (use a measurement called local – about 1 litre)

Animal type	June – December			January – May		
	Litres/ day/ animal	No. of wet cows	Length of lactation in weeks	Litres/ day/ animal	No. of wet cows	Length of lactation in weeks
Local cows						
Crossbred cows						
Exotic cows						

24. What quantities of milk and milk products were sold in each period last year?

Items sold	June – December		January – May	
	Qty sold weekly (lit/kg)	Unit price	Qty sold weekly (lit/kg)	Unit price
Milk				
Sour Milk				
Cheese				
Butter				
Others (specify: _____)				

25. Could you tell us where you sell your dairy products and how you sell them?

Items sold	Location/ distance of sale (km)*					Transportation mode (1=by foot, 2=bicycle, 3=motor cycle, 4=truck/other vehicle, 5=animals (i.e. donkey))			Who sells? (1=husband, 2=wife, 3=adult male, 4=adult female, 5=male child, 6=female child)				Who buys? (1=direct consumer, 2=processors, 3=traders)			
	Home stead	Hawking	Collection point	Rural market	Urban market	Collection point	Rural market	Urban market	Home stead	Collection point	Rural market	Urban market	Home stead	Collection point	Rural market	Urban market
Milk																
Sour Milk																
Cheese																
Ghee																
Butter																
Others (specify:_____)																

*Note: writing down distance (km) indicates someone sells product at that location if not it should be left blank.

26. Do you fatten your animals for the market? -------yes---------no
If so, which animals and at what time of year,?

_____

_____

27.Could you tell us how many animals did you sell in each season last year?

Items sold	June – October			November – May		
	No. sold	Unit price	Reason for selling	No. Sold	Unit price	Reason for selling
Bulls (3 years and above)						
Cows (≥3 years and above)						
Cows/Heifers (1-2 years)						
Bulls (1-2 years)						
Male calves (0 to <1 year)						
Female calves (0 to <1 year)						
Sheep						
Goats						
Poultry						

28. Who takes the decision to sell an animal in the household, who gets the money from the sale and how are the proceeds used?

Type of livestock	Who takes the decision to sell the animal? (1=husband, 2=wife)	Who controls the income? (1=husband, 2=wife)	What is the income used for?
Cattle			
Sheep			
Goats			
Poultry			

29. Where do you sell your animals, how do they get to the market and who from the household sells them?

Animals	*Location/ distance of sale (km)			Transportation mode (1=by foot, 2=bicycle, 3=motor cycle, 4=truck/other vehicle, 5=animals (i.e. donkey))		Sales person (1=husband, 2=wife, 3=adult male, 4=adult female, 5=male child, 6=female child)			Buyer (1=direct consumer, 2=processors, 3=traders)		
	Farm gate	Rural market	Urban market	Rural market	Urban market	Farm gate	Rural market	Urban market	Farm gate	Rural market	Urban market
Bulls (≥3 years above)											
Cows (≥3 years above)											
Cow/Heifers (1-2 years)											
Bulls (1-2 years)											
Male calves (0 to <1 year)											
Female calves (0 to <1 year)											
Sheep											
Goats											
Poultry											

*Note: writing down distance (km) indicates someone sells product at that location if not it should be left blank.

Respondents: Livestock Producers

Section 2: Assessment of human health

A. General Hygiene

30. Where do you obtain water for household drinking? _____
    1. Home tap
    2. Public tap
    3. River/stream/pond
    4. Rain water
    5. Well
    6. Others (specify:_____)

31. What is the distance of the water source from the household _____ (miles/km/local measure)

32. Do you treat the water in any way? _____

33. Do you use the same source of drinking water for washing, cleaning and cooking? _____ Yes _____No If yes, go to Q34, if no, go to Q 35.

34. Where does the household get water for washing, cleaning and cooking? _____
    1. Home tap
    2. Public tap
    3. River/stream/pond
    4. Rain water
    5. Well
    6. Others (specify:_____)

35. What is the distance of the water source from the household _____ (miles/km/local measure)

36. What type of toilet does your family use? _____
    1. Pit latrine
    2. Bucket
    3. Bush
    4. Combination of (1,2 and 3)
    5. Others (specify: _____)

37. How far is the toilet from the house? _____ (miles/km/local measure)

38. Where do you dispose off household waste? _____
    1. Near by bush
    2. Burning
    3. Others (specify: _____)

39. Do you wash your hands every time _____they get soiled (dirty) or _____only every so often? (Tick which is appropriate)

40. After using the toilet and as long as your hand is not soiled (dirty), do you use a _____ dry material to clean your hand or _____do you wash them? (Tick which is appropriate)

41. If you wash your hand do you use_____
    1. Only water
    2. Both water and soap
    3. Others (specify:_____)

B. Diseases and Health

42. Please tell us which of the following health problem your household has experienced in the past 3 months? (Tick which box is appropriate for each household member.)

Health problem	Members of the household			
	Men	Women	Male children	Female children
Back pain				
Fever				
Diarrhoea				
Abdominal pain				
Persistent cough				
Weight loss				
Other (specify:_____)				

43. Where do you receive treatment for the above health problems?

Service	Members of the household			
	Men	Women	Male children	Female children
Hospital/health facility*				
Patent medicine store				
Self medication				
Herbal remedy				
Did nothing				
Other (specify:_____)				

* If the respondent(s) did not indicate hospital treatment ask Q 44.

44. What were your reasons for not using a hospital/health facility?

_____

45. Do you know of any diseases or symptoms that can be contracted by people rearing and milking livestock?
_____Yes _____ No If yes, go to Q46, if no, go to Q48.

46. If yes, list the diseases, their symptoms and mode of transmission

Diseases	Symptoms	Mode of transmission

47. Which of the diseases listed above can be prevented and can you tell us how they can be prevented?

_____

_____

_____

48. Which livestock products do you consume directly from your farm?

(a) Meat_____ (e) Milk_____

(b) Intestines_____ (f) Cheese_____

(c) Liver_____ (g) Butter_____

(d) Kidney_____ (i) Others (specify: _____)

49. Which of these products from your farm do you consume raw (i.e. without processing)?

50. How do you store these products from your farm?

51. What other livestock or dairy products do you regularly buy for the household to eat or for consumption?

52. In what form are they bought? (raw; processed; semi-processed)

Target Respondents: Livestock Producers

Section 3: Assessment of animal diseases

A. General Information

53. Are you resident in the area of study throughout the year? _____Yes _____No If yes, go to Q545 if no go to Q54.

54. If no, during which months of the year are you resident in the area? _____

55. If yes, what is the farthest distance to your grazing fields _____ (miles/km/local measure) and what time of year do you use this land _____ (dry season/wet season)?

56. What is the nearest distance to your grazing fields _____ (miles/km/local measure) and what time of year do you use this land _____ (dry season/wet season)?

B. Animal health

57. Could you tell us the most common animal ailments in your herd and how you treat them?

Animal type	List the animal ailments by name/symptom(s) and season (ws = wet season, ds = dry season)		How do you treat this ailment? *	Type of drugs used for treating this ailment	What is your source of information/knowledge for the treatment for this ailment? **
	Symptom	Season			
Adult cattle					
Young cattle					
Sheep					
Goats					

* (1=by self, 2= local herbs prepared by yourself, 3 = local remedy bought, 4 = conventional drugs, 5 = others (specify: _____))
** (1= from experience, 2= from father, 3= from friends, 4= government vet, 5= private vet, 6= others (specify: _____))

58. Could you list the most common causes of animal death in your herd?

Animal type	List causes *
Adult cattle	
Young cattle	

Adult sheep	
Young sheep	
Adult goats	
Young goats	

* Causes of death may or may not be related to animal diseases. But probe for diseases related deaths first.

s

59. Do you vaccinate your animals? _____ Yes _____No If yes, go to Q60, if no, go to Q61.

60. Against which diseases, do you vaccinate your animals?

Diseases	Period animals were last vaccinated against this diseases (month/year)
CBPP	
Anthrax	
B Q	
Others (specify:_____)	

C. Dairy practices and hygiene

61. Where do you leave your livestock overnight?

62. What is the distance of the overnight place from the household (miles/km/local)

63. Where do you obtain water for animal drinking? _____

1. Home tap
2. Public tap
3. River/stream/pond
4. Rain water
5. Well
6. Others (specify: _____)

64. What is the distance of the source from the household _____ (miles/km/local measure)

65. Where do you get water for processing dairy products? _____

1. Home tap
2. Public tap

3. River/stream/pond
4. Rain water
5. Well
6. Other (specify: _____)

66. What is the distance of the source of water from your household _____ (miles/km/local measure)

67. Do you use the same source of water in Q60 for washing dairy utensils? _____Yes _____ No If yes skip Q67 and Q65

68. Where do you get water for washing dairy utensils? _____
1. Home tap
2. Public tap
3. River/stream/pond
4. Rain water
5. Well
6. Other (specify: _____)

69. What is the distance of the water source from the household? _____ (Miles/km/local measure)

70. With what do you wash/sterilize your dairy utensils? _____
1. Water only
2. Water and soap
3. Water and Dettol /Sanitas
4. Other (specify: _____)

Target Respondents: Livestock Producers
Section 4: Feed management resources and environmental management

A. Animal feed resources

71. Could you tell us the most common type of feeds fed to your animals from your own farm (so not bought) in the different seasons? (please rank, 1 = most important source and so on)

Feed type				

Grasses specify:								
Tree leaves/browses specify:								
Sorghum stovers								
Millet stovers								
Maize stovers								
Cowpea hay								
Groundnut hay								
Grains specify:								
Others (specify: _____)								

72. Do you purchase feed to feed your animals? _____Yes _____No If yes go to Q 72, if no go to Q 75. (e.g. grasses, stovers, hay/haulm etc.)

73. Do you purchase concentrates and supplementary feed to feed your animals? ____Yes _____ No If no go to Q 75, if yes, go to Q74. (e.g. cotton seeds cakes, brewers grain, salt lick, etc.)

74. Could you list the type of feed purchased during the last rainy and dry seasons to feed your animals? (e.g. roughage, basal feed, salt licks etc.)

Feed type	Quantity purchased during the last rainy season	Cost of feed during the last rainy season	Which animals are fed with the purchased feed	Quantity purchased during the last dry season	Cost of feed during the last dry season	Which animals are fed with the purchased feed	Why is there a difference between the dry and rainy season	Who does the purchasing (1=husband, 2=wife, 3=adult male, 4=adult female, 5 = children)

B. Animal management [redacted] manure utilization.

75. Could you provide us some information on the livestock production system you practice? (i.e. cut and carry, grazing system, or a combination of the two).

_____
_____
_____
_____
_____

76. Do you use manure? _____Yes _____No If yes, go to Q74, If no, go to the end of the questionnaire.

77. If no why? _____

_____

78. If yes, what do you use your manure for?
1 Improving own farm soil fertility
2 Fuel for home cooking
3 Plastering home floor
4 Sold to others for soil improvement

79. How do you apply manure to the soil of your farm? _____
1. Carry manure from stable to cultivated fields (If so, how _____)
2. Grazing animals on farm plots
3. Corralling of animals on cultivated fields

80. Do you sell manure? _____Yes _____No If no, go to Q78.

81. Could you estimate the income received last year from manure sales? _____ (₦)

82. Do you buy manure? _____ Yes _____No If no, go to Q80.

83. Could you estimate the amount spent to purchase manure by you last year? _____(₦)

84. What do you do with the excess manure that is not used immediately?

_____
_____
_____
_____
_____

85. How do you store it?

_____
_____
_____
_____
_____

86. Do you use any other soil amendments on your land? If so, which and why?

_____
_____
_____
_____
_____

Thank you.