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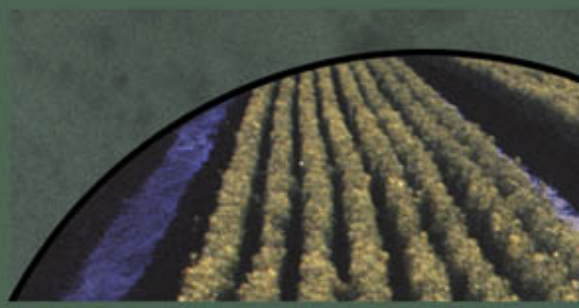

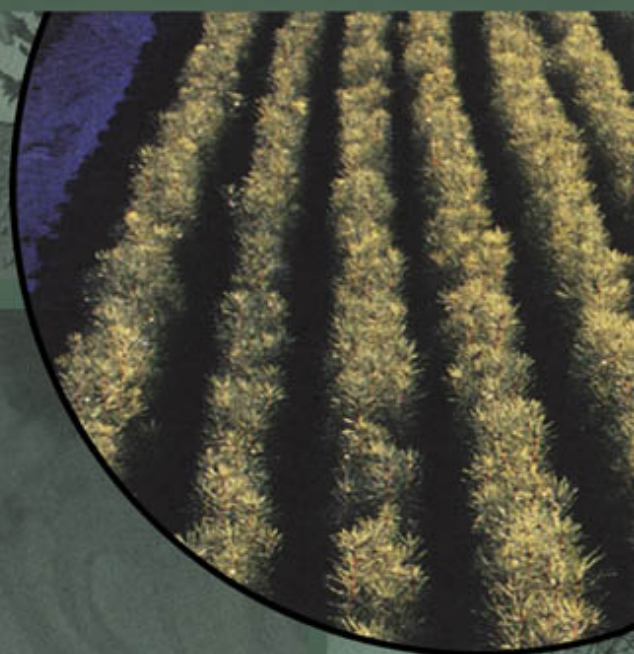
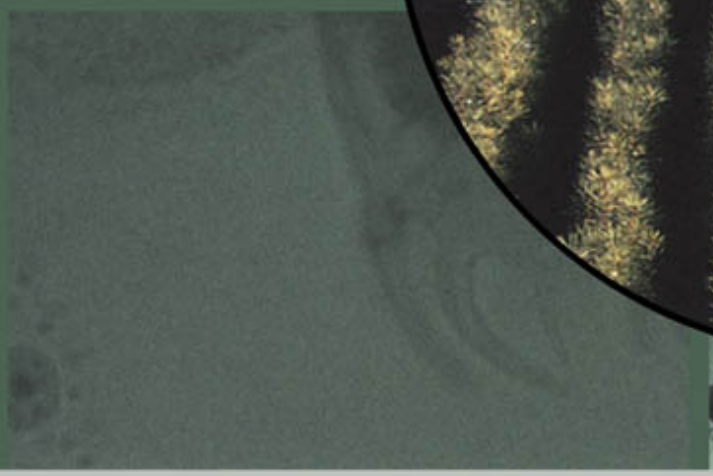

sous la direction de / edited by Olanrewaju B. Smith

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Counting the costs and benefits of implementing multi-country collaborative research projects: The case of the peri-urban Inland Valley Dairy Project in West Africa

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Résumé

Ce document décrit le processus de conceptualisation, de formulation et de mise en œuvre d'un projet de collaboration multi-institutionnel et interdisciplinaire auquel participent trois systèmes nationaux et trois centres internationaux de recherche agricole. Ce projet appelé Projet laitier des bas fonds a été réalisé au Niger, en Côte d'Ivoire et au Mali. Après une analyse des frais de transaction, on est parvenu à la conclusion que ceux-ci pourraient être élevés mais que les avantages d'une telle approche de type maillage l'emportent de loin sur les coûts. Ces coûts proviennent essentiellement des consultations, des problèmes de communication, des goulots d'étranglement institutionnels et bureaucratiques apparaissant dans le transfert et le versement des fonds. Parmi les avantages obtenus, on peut citer le fait de se doter d'une capacité, d'instaurer des liens institutionnels, d'échanger l'information, de développer et d'utiliser en commun des méthodologies et de procéder à des extrapolations valides des résultats d'un site particulier pour élargir les domaines de recommandation. Ce document se termine par des recommandations destinées à favoriser un maillage plus efficace.

Abstract

This paper describes the processes of conceptualizing, formulating, and implementing a multi-institutional, inter-disciplinary, collaborative project involving three national agricultural research systems and three international agricultural research centres. This project was called the Inland Valley Dairy Project, conducted in Nigeria, Côte d'Ivoire and Mali. After an analysis of the transaction costs, the conclusion reached is that these could be high, but that the benefits of such a networking approach far outweigh the costs. Costs were mainly associated with consultations, communication problems, institutional and bureaucratic bottlenecks related to the transfers and disbursements of funds. Benefits include capacity building, institutional linkages, information sharing, the development and use of common methodologies, and valid extrapolation of site-specific results to wider recommendation domains. Appropriate recommendations were made in order to promote more efficient networking.

Introduction

For most countries in West Africa, domestic food production has traditionally occurred on uplands ecosystems. The main means of restoring their soil fertility was to let the land go fallow. But, as human populations rise and the demand for food expands, there is increasing pressure on these uplands. As a consequence, fallow periods have been declining. The World Bank (1984) reported that the agricultural productivity per capita in West Africa declined during a period of 30 years (from the 1950s to 1980s). For a few major crops, there were some increases in production in absolute terms, but these were achieved largely through expansion in the upland areas under cultivation. There is some evidence that suitable uplands for agriculture are becoming scarce due to high population growth in the sub-region (Windmeijer et al. 1994; Thenkabail and Nolte 1995a). Consequently, there is pressure to cultivate the more fragile uplands and marginal lands. A longer-term consequence of accelerated expansion of crop lands to marginal unproductive lands is degradation of the environment.

The process of degradation could be slowed down somewhat if the vast potentials of the lowlands — especially the inland valleys — are exploited. The inland valleys offer an extensive, fairly unexploited potential for agricultural production (Thenkabail and Nolte 1995b). Since the most extensively used inland valleys are usually found around large human settlements (cities, urban towns), inland valleys could substantially contribute to urban agriculture and food security for urban and peri-urban human populations. Of the estimated 50 million ha inland-valley areas in West Africa, less than 20% are currently under cultivation. The high agricultural potentials of these valley bottoms and their hydromorphic fringes are attributed to their better soil fertility due to sedimentary deposits from adjacent slopes or uplands (Moormann and van Breeman 1978; Raunet 1982) as well as the availability of residual moisture during the dry season.

This availability — coupled with the relative ease with which underground water can be reached by digging wells or ponds — has encouraged dry season commercial cultivation of vegetables in the valley bottoms (tomatoes, peppers, cabbages) and highly priced crops such as maize. In the wet season, staple foods such as rice and cassava are usually planted in the inland valleys. But the use of the inland valleys exclusively for cropping activities is causing concern among livestock producers who historically used the inland valleys for grazing and watering. Evidence shows that the frequency and level of conflicts and clashes between crop farmers and livestock owners have increased in recent times, after the introduction of dry-season farming schemes in inland valleys. There is, however, a real need to augment the consumption of animal protein by a population which is dependent on

the root or cereal-based farming systems that are typically found around inland valleys. In view of this, it was important to include livestock in cases where the inland valleys are being developed for sustainable agriculture. Examples of typical existing — or potential — livestock enterprises in and around inland valley areas include the rearing and fattening of small ruminants, and milk production. After considerable analysis, intensive or semi-intensive dairy production — with its developmental role through processing and marketing of dairy products — was thought to be an industry which could best benefit from the existing emerging farming systems. Therefore, a development-based research project to improve dairy production in and around inland valleys was developed as a multi-institutional, inter-disciplinary research project, to tackle the several issues raised earlier, in terms of valorizing the inland valleys.

The objective of this paper is to share the experiences gained during the conception, development, and implementation of such a complex project which could be best approached via a networking mode linking various individuals, institutions, and disciplines. The benefits and constraints — including transaction costs for operating such a mini-networking format involving scientists from several countries — are briefly described and appropriate recommendations made.

Approaches

Casting and formulation of the project

In conceptualizing how the introduction or the improvement of livestock-based production models and their resultant outputs might contribute to the achievement of overall land productivity, two issues were examined: how to achieve annual multiple-cropping on inland valley plots or fields based on the availability of residual moisture; and how to strengthen existing links between upland and inland valley farming subsystems to achieve multiple cropping. Analysis proved that the opportunities for achieving multiple cropping could be improved in three ways: by reducing labour constraints associated with farming in both uplands and inland valleys; by improving water management; and by maintaining or improving soil fertility. An outcome of this analysis was the development of a proposed production model linking animal draught power, forage production, and dairy production. The task was to show how such a model (Figure 1) would lead to improved dairy production, contribute to soil improvement and better water management, and, ultimately, to contribute tp an increase in total agricultural production. In seeking partnerships and funding for research into achieving these outcomes in few selected

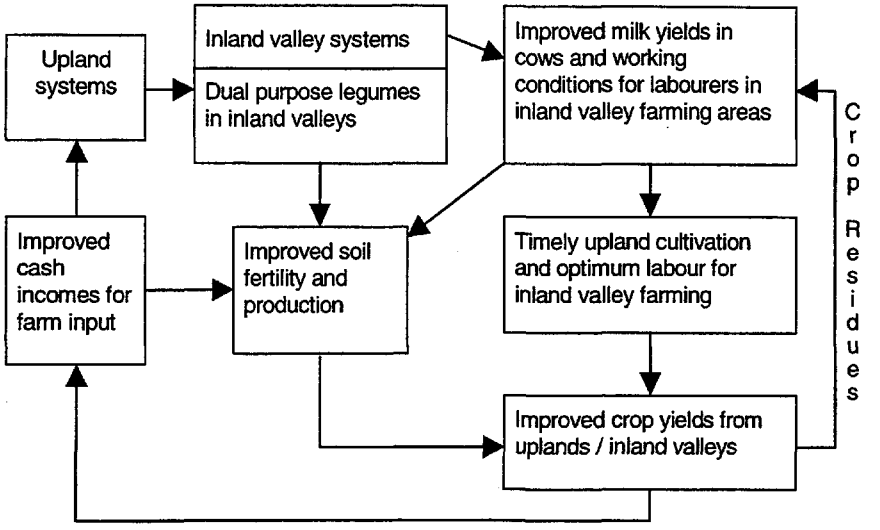

Figure 1. Linkages among elements of animal draught power-crop (legume) — dairy model

countries on a pilot-study basis, the forage- and dairy-production component of the model was proposed as a first-stage activity.

Testing the waters

Planting forage for livestock in inland valleys was understood to be a novel idea. Accordingly, there was a possibility that it might not find acceptance, in view of the competitive edge which vegetable growing might have over forages. Therefore, opinions were sought, from researchers in National Systems (NARS), Non-Governmental Organizations (NGOs), farmers' associations and other stakeholders. In Nigeria, views and ideas of key researchers at the National Animal Production Research Institute (NAPRI), extension program leaders at the Agricultural Development Project of Kaduna State (KADP), and the Fadama (Inland Valley) Users Association were sought. The general view was that a good entry point would be the introduction of dual-purpose crops that could provide food and feed. This would mean that farm families wishing to adopt such a technology might be able to compete with vegetable growers by producing grains from legumes, while their livestock would benefit from the hay.

Once positive reactions were obtained from locally-based institutions, the two major international groupings involved — the West Africa Rice Development Association (WARDA) and the Inland Valley Consortium (IVC) in Bouâké, Côte d'Ivoire — were contacted for their views as to how a commodity such as legume forage might fit into a rice-based cropping research agenda. They were also asked

about the role they might play in the implementation of the project. WARDA had an interest in the use of animal draught power for the cultivation of inland valleys; thus they saw the animal draught power — that is, the forage industry — and the dairy proposal as areas they could support. Similarly, some discussions were ongoing among the Steering Committee of the IVC and the National Coordinating Units (NCU) of the IVC on the possibility of including some livestock activities in the latter's core program. In view of these developments, IVC encouraged the preparation of the final research proposal.

Initial contacts with NARS' scientists and directors

With the feasibility of the Inland Valley Dairy Project ascertained and the support from WARDA and IVC obtained, the research proposal was refined. Copies were sent to director-generals through research directors of NARS in the targeted countries — Nigeria, Côte d'Ivoire and Mali — to indicate their interest, to comment on the proposal, and to offer letters of support as part of the submission of the proposal to the identified donor. Research directors and key senior scientists had been appraised of the project objectives and expected outputs in order to be able to defend the project with their director-generals.

All received letters of endorsement were submitted as part of the application. Key scientists in the national programs were updated on the status of the proposal with respect to funding prospects from the donor agency.

Getting started

Once the donor informed the coordinating institution — the International Livestock Research Institute (ILRI) of Ibadan, Nigeria — of the approval of the project, plans were put forward to have a Project Launching Workshop in a location where inputs from other collaborators (outside of the three NARS) would be forthcoming. The choice of WARDA headquarters in Bouâké, Côte d'Ivoire was made to enable WARDA and IVC to contribute to the development of mechanisms under which the project would be executed. The objectives of the workshop were:

- to discuss ongoing livestock-related research activities in inland valley areas in the three target countries;
- to develop and agree on a methodological framework for conducting the research;
- to agree on a calendar of activities; and
- to establish and agree on implementation mechanisms.

A highlight of the workshop was the presentation of a set of pre-formulated, ex-ante dairy models (Agyemang and Adediran 1997) that could be implemented in

each of the countries after appropriate modifications. The workshop's major outputs were four-fold: an agreement on the sequence of implementation of the project; the commitment to use common methodologies to enable cross-country comparisons; adherence to the agreed-upon calendar of activities; and the assignment of responsibilities with regards to methodology development. The executing scientists from the ILRI were charged with developing sampling methods, hypotheses, minimum data-sets, questionnaire instruments to generate the required data, and methods of analyses. In developing these methodologies, due attention was given to drawing on existing ones: for example, those being used by WARDA, IVC and the ILRI-wide Market Oriented Smallholder Dairy Project (MOSD). Thus, a mini network was formed because the players agreed to use common methodologies, adhering to agreed calendars and approving the coordinating role of the executing scientist from ILRI. Subsequent dealings with the country teams reflected a network approach.

The launching workshop was considered a success in many respects. Distance and time constraints precluded face-to-face intensive discussions with most of the participating NARS scientists during the project proposal preparation phase. But, the full participation of NARS scientists during the workshop (in terms of papers presented and the open discussions on the issues) attested to the general interest in the project's objectives. Because the project was embraced by WARDA and because the IVC hosted and organized its logistics, the major players in the development of inland valleys recognized the role livestock can play. The willingness of the IVC to use its accounting and budgeting infrastructure within WARDA to facilitate the transfer of research funds to NARS teams in Côte d'Ivoire and Mali, was both innovative and reduced the delivery time of funds to the teams. Another significant outcome of the meeting was a publication of the workshop proceedings (Possibilities for increasing dairy production in inland valley areas of West Africa [Agyemang et al. 1998.]) This document illustrates the state of livestock-related research activities in inland valleys in the three target countries.

Implementation phase

Implementation of the Inland Valley Dairy Project started with the development of the relevant hypotheses, sampling procedures and questionnaire instruments in English and French (Agyemang and Smith 1997a; Agyemang et Smith 1997b) for the characterization of the inland valley crop-livestock systems. Drafts of these documents were circulated among NARS teams for comments. With access to both the English and French language versions, the NARS teams in francophone countries (Mali and Côte d'Ivoire) made minor modifications to some questions to reflect the intended meaning of the English version.

The field surveys were executed by the various NARS teams from January to April 1998. Approximately 100 group interviews and 300 farm household interviews were conducted in each country. A post-survey mini-workshop is planned for the end of June, 1999 to enable NARS team leaders to present results of the characterization survey. At the meeting, refinement of the proposed ex-ante dairy models (Agyemang and Adediran 1997) is to be undertaken to reflect the special circumstances of each country. In addition, results from pre-testing of these models in selected farmers' fields in northern Nigeria, undertaken by ILRI (Agyemang and Smith 1998), will be presented to enable NARS teams to identify with the problems encountered in implementing such models. A summary of results of the pre-testing of the agronomic components of three of the four ex-ante models in northern Nigeria are shown in Table 1. Forages generated from inland valleys in Zaria's Northern Guinea Savanna zone were used as supplements for dairy production in the animal component of one of the models (Figure 2). A quick appraisal of the returns of the inland valley system at town- or village-level showed that the data generated could be used to test major assertions or hypotheses about the potential and use of inland valleys (Tables 2 and 3). Based on the preliminary results of the work programs implemented in northern Nigeria, (system characterization and pre-testing of ex-ante models), improvement in dairy production through the use of forages from inland valleys definitely seems feasible. Wider testing of these models under varying inland valley conditions in the next planting season will provide more concrete results.

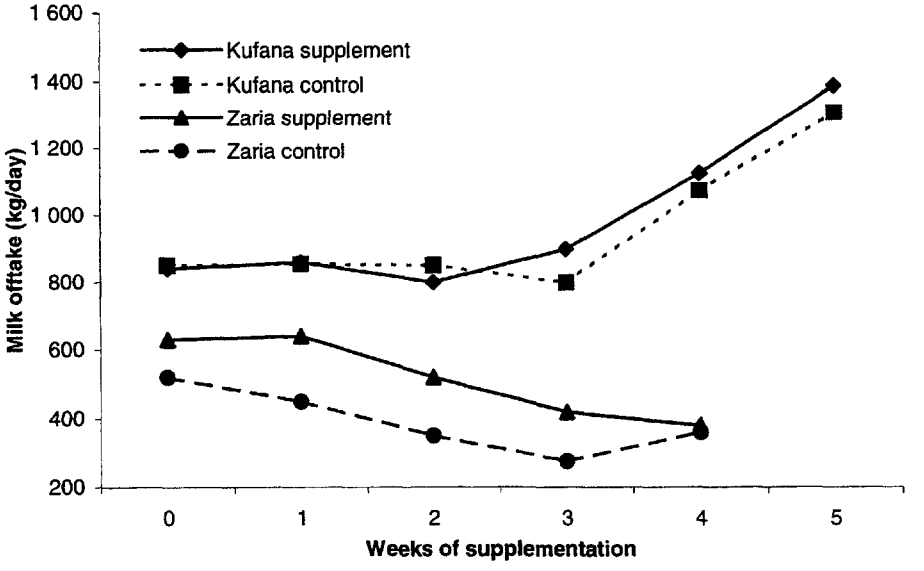

Figure 2. Milk offtake patterns in Bunaji cows supplemented with forages from inland valleys

Counting the costs and benefits

The implementation of any piece of research work entails costs that are both financial and non-financial (for example, transaction costs). In this kind of collaborative research that involves many countries, the incidence of both categories could be high, depending on the mechanisms employed in conducting the research. For example, projects in which regular workshops wherein sharing and exchanging ideas are a major activity will be more costly than ones in which a coordinator deals with each country's team separately, while collating and synthesizing results.

Table 1. Performance of rice and dual purpose legumes planted in inland valleys in wetter parts of Northern Guinea Savanna (Kufana, Kaduna State, Nigeria; 1997)

	Rice					Legumes (forage yield DM t/ha)		
	Variety	DOP	DOH	Grain (t/ha) ±SD	Straw (t/ha) ±SD	Achisuru	IAR48	Lab
Model 1	Local late maturing	April/ June	Oct/ Nov	2.71 ±1.31	5.02 ±0.13	1.47 (NA)	1.50 (NA)	0.80 (NA)
Model 2	Improved early maturing	July	Nov/ Dec	2.20 ±0.52	2.23 ±0.94	1.20 ±0.88	1.79 ±0.2	1.20 (NA)
Model 3 (Base model)	Local late maturing	July	Dec	2.53 ±1.12	2.60 ±0.72	0.78 (NA)	2.60 ±1.19	4.60 (NA)

DOP=Date of planting; DOH=Date of harvesting; SD=Standard error.

Table 2. Land use patterns in inland valley (IV) areas in Northern Guinea Savanna Zone, Nigeria

% of group of respondents indicating	More fallow lands in IV settlement areas than settlements where there are no IVs	Longer fallow periods in IV settlement areas than settlements where there are no IVs	Less cropping on unproductive lands in IV areas than in settlement areas where there are no IVs
Yes	20	20	80
No	80	80	20

Table 3. Patterns of livestock agriculture in inland valley (IV) areas in Northern Guinea Savanna Zone, Nigeria

% of group of respondents indicating	More dry season farming activities in IV settlement areas than settlements where there are no IVs	More livestock rearing activities in IV settlement areas than settlements where there are no IVs	More cash crops grown in IV areas than settlements where there are no IVs
Yes	93	77	97
No	7	23	3

Transaction costs

For this discussion, the following transaction costs (time and logistics) are discussed: development of the project proposal; processes involved in organizing a workshop; procurement of funding for country teams; development of common methodology frameworks and instruments; and monitoring the progress of the activities in the field.

When formulating projects that are implemented collaboratively by an International Agricultural Research Centre (IARC) and NARS, a basic principle is to develop a clear statement on the "equality of partnership" among collaborating institutions. Equal partnership implies that all institutions must be fully consulted on all important aspects of project development and implementation. National program directors become particularly concerned when their institutions' names are put on proposals as collaborators and submitted to donors — but without their prior knowledge. Therefore, a considerable amount of time was invested in ascertaining the interest of key scientists and to obtain the approval from directors before submitting the proposal to the donor. Most of the transactions were made through letters, E-mail messages and telephone conversations. Unfortunately, however, the poor communication channels that exist between Ibadan, (where the executing scientists from the coordinating institution are located), and the NARS both within and outside of the country, made the process longer and cumbersome.

As well, research and development on inland valley agriculture is at different stages in the three selected countries. Therefore, basic information on system characteristics in the various countries were not uniform. Adopting common methodologies for networking operations meant that all NARS teams started at the same point. This was considered lost time to countries where some information was already available. For example, teams in Nigeria and Mali were in a position to institute some of the proposed ex-ante models, whereas Côte d'Ivoire had to obtain primary data about the inland valley crop-livestock systems before the testing of any models could proceed. Negotiations were required to arrive at an agreed-upon compromise.

The arrangements involved in the transfer of funds to country teams were perhaps the most time-consuming exercise in the whole process of executing this multi-country collaborative project. Traditionally, cheques are issued to national institutions, who then submit them to local banks for clearance; this can take as long as three months. Rules and regulations in both IARCs and NARS prohibit issuing cheques in the name of individuals, or cash payments. Thus, projects are usually behind time and, where some project activities are dependent on climatic seasons, a whole year can be lost. In this project, a delay in bank clearance occurred in two of the three countries.

Once funds become available at the national program level, bottlenecks and administrative procedures can further delay the release of funds to NARS teams. In some institutions, incoming funds to the institutions' accounts may not be earmarked for the specific projects. Therefore, it is suspected that funds could be used for other needs of the institutes. In the implementation of the current project, there were two cases where project activities were delayed because funds were not made available to project teams on time. Rectification required several correspondences between the executing scientists of the coordinating institution and NARS.

Benefits

One of the benefits to be derived from multi-locational or multi-country research is to investigate an identified problem or constraint along a known gradient (such as agro-ecological, population, market) in order to extrapolate results. The inland valleys are very heterogeneous (Andriesse 1986; Izac et al. 1991); so are the farming systems associated with them along with the current — as well as future — markets that could develop for products from such systems. For an enterprise like dairying, which is known to have considerable developmental spin-off on household economies and the communities at large, it is desirable to be able to extrapolate site-specific results to larger domains.

On this account alone, the potential benefit from the mini-network approaches adopted in this study far outweighs the constraints and transaction costs enumerated above. The opportunities offered by the use of common methodologies in the project allow the advantages associated with such approaches to be realized. These include the ease of undertaking cross-site analyses, opportunities to undertake meta-analyses, and the ability to extrapolate more valid conclusions which arise from improved designs. The mini-network approach adopted in this project enabled not only linking ILRI (an IARC) directly with all individual participating NARS, but also encouraged information-sharing among the NARS. A positive spin-off from the collaborative arrangements between ILRI, WARDA, and the IVC — which were initiated during the project proposed phase and strengthened during the launching workshop — was the development of ties between WARDA, IVC and the project teams in Côte d'Ivoire and Mali. A further extension of these linkages are those which are emerging between the IVC's national coordinating units in the three target countries, and the country teams working on the Inland Valley Dairy Project. Documentation produced by the IVC (research reports, newsletters, conference workshop proceedings) are now reaching the country teams. In Côte d'Ivoire another level of linkage has emerged between its country team and two institutions — the Eco-ferme and the Bovin Industriel — which were invited to the launching workshop.

In general, the time and effort put in by the coordinating institution's executing scientists in leading the development of the proposal, developing methodologies and documentation, following-up all transfers of funds, and monitoring ongoing research activities are considered significant in relation to the overall research portfolio. The projected benefits arising from linkages among NARS — and among NARS and IARCs — are expected to offset the transaction costs associated with the implementation of the project.

Suggestions for improving efficiency of networking in collaborative research

The most important and re-occurring problem encountered during the implementation of the Inland Valley Dairy Project was the delay in funds reaching research teams in the various countries. Not much can be done about the time lost because of the long clearing time through the banking systems. But time loss to research implementation due to administrative bottlenecks and procedures in NARS could be eliminated or reduced considerably. Suggested improvements to achieving this include requiring collaborating NARS directors to have firmer commitments to collaborative projects. This commitment should be strong enough to permit making the institution's funds available to externally funded, collaborative projects if and when funds for the latter are delayed. Secondly, the concept of the interdependence of the various NARS teams' efforts to the "joint survival" of the entire network's activities must be stressed to individual NARS directors. This is mandatory, to ensure that the project's funds are managed so NARS teams have access to funds without hindrances — and always within the limits of institutional guidelines.

One of the objectives of the Inland Valley Dairy Project was to build critical scientific mass at NARS for dairy research. The networking approach used in the project ensures exchanges of information and ideas so as to build an effective, critical scientific mass that can contribute to each of the NARS teams. However, more direct communication links among project teams should be encouraged. During the stage of the project's proposal development, exchange of visits among the teams should be included and budgeted for. Where workshops and meetings form part of the project activities, rotation of meeting sites should be considered to enable teams take advantage of visiting other teams' study sites. Possibilities for sharing expertise (data analyses, specialized skills) and facilities (laboratories for feeds and soils) should be explored.

In order for NARS teams to take advantage of IARC's specialized facilities and benefit from its proven, efficient mechanisms (as well as from IARC's broader international connections and expertise) some formal arrangements should be

adopted. Such arrangements would allow other collaborating IARCs or Regional Institutions in the region or country, to assume some supervisory roles which, otherwise, would be provided by the coordinating institutions. Thus, a three-way, closed linkage could be established. In the context of the Inland Valley Dairy Project, both WARDA and the IVC could provide support to country teams in Côte d'Ivoire and Mali during their regular supervisory visits to their countries' project sites.

On the part of donors, more liberal and flexible approaches must be used in determining and awarding budgets. Budget lines for communication, training, workshops, exchange and supervisory visits should be looked at more favourably.

Conclusions

The development of the research proposal for the improvement of dairy production using feed resources from inland valleys; preparations for its commencement; development of project documentation and instruments; and its actual implementation in a collaborative, multi-country project format have all involved considerable amounts of transaction costs in terms of time spent by the executing scientists. So have the logistics that were put in place by the coordinating office and other collaborating IARCs (IVC/WARDA).

However, so far the outcomes and outputs from the project indicate that its potential benefits far outweigh the costs and that future projects can be run in a similar format. Long-term benefits are likely to arise from the linkages being developed. Problems and constraints, which are mostly related to funding and fund release, could be eased by obtaining firmer commitments from NARS directors. Meanwhile, the opportunities identified for increasing linkages among NARS — and among NARS and IARCs — could be enhanced by more donor funding.

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