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Research and Extension Linkages for Small Holder Agriculture in Zimbabwe

Editors: E.M. Shumba, S.R. Waddington and L.A. Navarro

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Department of Research and Specialist Services
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Proceedings of a workshop on 'Assessing the Performance of the Committee for On-Farm Research and Extension (COFRE)' Kadoma, Zimbabwe. 7—9 May, 1990.

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OPENING ADDRESS

R.J. Fenner, Director, DR & SS

Ladies and Gentlemen

Apologies for the absence of Dr Ndimande. On his behalf, I wish to welcome you all to this workshop to assess the impact that the Committee of On-Farm Research and Extension (COFRE) has had on our programmes in DR & SS and AGRITEX and on our relationship with farmers.

The last major COFRE workshop was in May 1987 at Matopos Research Station. It successfully addressed the need of setting research and demonstration priorities in Natural Regions III and IV.

Now three years later, when COFRE is four-years old, we meet again. I believe this meeting was arranged at a most appropriate time. A four-year old toddler has left the baby stage: it is up and running and eager to learn all about life. The formative years are ahead. So, as we now assess the progress made by the Committee so far, we must also eagerly look ahead to ensure a continuing dialogue between research and extension.

But who are 'we'? As with the first workshop, we have a wide and deep breath of participant representation, around 50 percent DR & SS and 50 percent AGRITEX.

From our side, we have heads of Stations and Institutes and senior research officers. From AGRITEX, we have heads of Branches, provincial and regional officers and several, may I say, practising officers. Later, we shall be joined by a representative of IDRC, our generous sponsor here at Kadoma.

What should be our aim during the next two days?

Firstly, we need to review the achievements of COFRE. In particular, have we done what we set out to do four years ago? What problems has COFRE faced and how can they be overcome?

Secondly, let us be visionaries and map out COFRE's programme for the next 4-5 years. But above all, let us use the workshop as a forum for not only formal but informal interaction between ourselves. Let us take this opportunity to establish new contacts. After all, if you know the face that fits the name, cooperation is that much easier.

I declare the workshop open.

IMPORTANCE AND NATURE OF RESEARCH AND EXTENSION LINKAGES: AN OVERVIEW

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Introduction

The continuous and overlapping technical task of the public Agricultural Research (Rs) and Extension (Es) services is to develop and provide improved technical know-how and materials for agricultural producers in order to improve their contribution to society's and their own well being.

This task is neither simple nor unchallenging on time and across the land. It is helped or constrained by the state of development of each society, its public and private institutions, and the farmers themselves. It cannot be accomplished by Es or Rs alone nor by the two together in isolation from other groups. It needs to be flexible so as to adjust continuously to these space and time changing conditions. It needs to be efficient at all times in using the limited public resources available. It needs to be effective to obtain public and private recognition and support in terms of working resources.

The least Rs and Es can do is to join efforts, to collaborate or at least coordinate activities in order to enhance their combined contribution.

Linkages are mechanisms that help to hold institutional elements together and permit coordination. There are administrative linkages (fiscal, personnel practices, planning and programming, administrative support services (Annex Table 1) and direct service linkages (Annex Table 2). There are also barriers to (Annex Table 3) and facilitators (Annex Table 4) of coordination, which need attention.

Coordination can be: 1. voluntary, 2. voluntary with formal agreements, or 3. mandated. It can involve joint planning, actions or evaluation of outcomes. It can occur within a community, between organizations, across communities, and between different levels in the organizations (Mulford and Klonglan, 1981).

The institutional elements which can be coordinated and the best levels at which to coordinate them are: 1. resources at community level, 2. programs at the organizational decision making levels, 3. clients at the agencies line staff in direct contact with clients and 4. information at all levels.

However, neither linkage nor methodology will substitute for the good will of participants in both services. To understand the common task, to compromise individual interests, to reach consensus and to work responsibly for the common interest, all these require communication, i.e. effective dialogue.

In what follows, the Rs & Es joint work is revisited in concept and through history for some regions of the world. Such action will show the tremendous variability and the lack of a common model to fit all conditions at all times. This is to encourage local dialogue and the development of linking mechanisms between Rs and Es. The purpose should be to facilitate coordination and cooperation at all times, being aware of the contemporary conditions in the economy, other institutions and the farming community itself. The final outcome should be a more effective and efficient Rs and Es work.

The research-extension joint work revisited

The contribution of people to their own and others' livelihood and development, in groups or individually, depends simultaneously on their respective:

a. resources endowment (quantity and quality)
b. goals and motivations (objectives, ambitions)
c. knowledge and abilities to use **a** according to **b**

Technology in itself implies knowledge and the ability to combine resources in order to obtain certain outcomes. Its impact depends on its own nature but also on its complementarity with other elements of the **c**, **a** and **b** sets at the user level.

As Agricultural Researchers and Extensionists, we usually represent one group of people (**A**) and try to influence another group (**B**). Both groups have their own **a**, **b** and **c**, and intersection sets. We are intermediaries; we provide a service. We may represent the public sector (society) or a particular private group and we usually try to influence a certain group of agricultural producers.

In essence, our (**R**s and **E**s) joint and primary task is to reinforce **c** in the target group (this is B_c) according to those elements of **b** in the group that we represent (this is in A_b). Examples are governmental campaigns to develop and extend techniques to increase maize productivity with the expectation of increasing maize production - an element of A_b.

We can already anticipate problems for our task if the elements of A_b that we follow are not present in B_b. This is a common occurrence and source of frustrations. It is the responsibility of group **A** to see that the element of A_b in use (e.g. to increase maize production) is present or is included in B_b before attempting to reinforce B_c and, for that matter, B_a, with the true intentions of success.

Governments can attempt to modify or adjust B_b through different means so it will coincide with the public (society's) interest manifested in A_b. Sometimes they do it through compulsory policies, sometimes via markets, or other incentives, e.g. reinforcing elements of B_a. Private groups can attempt this via markets and other incentives only.

Even if the elements that we follow in A_b are present in B_b, we still can anticipate problems if the technical/knowledge reinforcement intended: 1. is not compatible with the resources endowment (B_a) of the beneficiary group, or 2. cannot be internalized in B_c because of the limited basic knowledge and abilities (c) of group **B**. Again, complementary actions may be needed to ensure the results expected from a particular effort to reinforce the technical knowledge of a group of farmers.

To be aware and to respond appropriately to all of the above, the **R**s and **E**s linkages and collaboration are a must. The many demands for technical know-how by the many farmers need identification and collation into priorities and conditions compatible with the capabilities of research. Research results need to be packaged to facilitate their communication, motivate their use and facilitate their effective utilization. Only the combined expertise and resources of **R**s and **E**s can accomplish this, when well supported by other compatible service groups.

In the few cases of better endowed (strong B_a) and educated (already healthy B_c) farmers usually producing commodities with a certain and accessible market, the technology development and extension work is easy and effective. In fact, those farmers usually demand specific technologies from **R**s and **E**s groups which are accessible and able to respond; i.e. the relevant elements of A_b are also in B_b. In these cases, the technology is necessary and sufficient because all other required conditions are present as manifested through the farmers' explicit and effective demand for such technology. As we will see, examples of this exist in the history of the **R**s and **E**s development and in almost all countries, including Zimbabwe, in the case of commercial and well organized farmers. Furthermore, well endowed farmers can create and pay their own **R**s and **E**s services when these are either not available or satisfactory.

Difficulties arise in the case of smallholders, our most common and important beneficiary in developing countries. They are at best in a transition from subsistence to the market economy and their **a**, **b** and **c** sets are

weak. To reinforce their B_c set only will, in most cases, be insufficient for the requirements of A_b and most likely not be among the priorities according to B_b. Modern attempts to custom fit technologies to the present restrictions of the smallholders a, b and c sets (e.g. FSR efforts) are well intended, very stimulating, but still offer limited and slow direct impact if done in isolation. Probably, the resulting re-encounter of Rs and Es as part of these efforts, and also their joint call for attention and complementary support from policy and decision makers on behalf of the smallholders, have been the most promising outcomes which need more acknowledgement and reinforcement. This implies to stimulate further the 'lobbying' capability of Rs and Es on behalf of the beneficiaries.

The above analysis repeats for us that, in most cases, technology is necessary but not sufficient to increase agricultural production and to benefit society as expected. Additional efforts to align the farmers' motivations with those of society at large and/or to reinforce their resources and basic knowledge via other services are usually needed at the same time or in advance. In most cases, Es are also called to participate in those additional efforts. This enhances their potential influence but also competes for their attention to the technical and interactive work with Rs.

The above and other reasons, usually associated with limitations in the respective a, b and c sets, explain the notorious and persistent lack of effective interaction between Es and Rs groups found across most of the developing world. This lack of interaction has many times rendered the two groups: 1. ineffectual in their respective tasks, losing the confidence and effective support of the government and potential beneficiaries, and 2. competitors instead of being partners in a common task, losing understanding of the nature and need for that common responsibility, and usually blaming each other or duplicating each other's tasks.

Any attempt to facilitate a re-encounter and to activate a permanent dialogue between Rs and Es should be encouraged. The dialogue should acknowledge the need to interact and collaborate effectively for the common task while understanding each group's additional responsibilities and the need to also fulfil them. Initially, such dialogue should bravely concentrate on the identification of the causes that restrict interaction/collaboration and in a joint search and lobbying for solutions. Persistence will be required since the solutions to the present problems, which accumulated over the years, will seldom come quickly. Part of an effective lobbying is to show convincingly to policy makers the value of Rs and Es joint contributions, via well planned and executed efforts with clear results.

Research and extension linkages. A historical perspective

An overview of Rs and Es development, with attention to the nature and strength of their linkages through time and for some regions of the world, is attempted next.

The US Land Grant College System

Extension as a complement to research originated in England and was adopted in the USA in response to the interest of the agricultural sector during the XIX century (Saravia 1983).

Beginning with the Farmers Association created in Philadelphia during 1785, hundreds of other farmers' societies appeared later in the US. Their objective was to interest members on discussing common problems and to lobby for help from the government to solve them. Among their most important requests were facilities to increase the farmers' and particularly the farmers' children knowlege of agricultural production. This pressure resulted in a great number of agricultural schools and culminated with the Land Grant Colleges Act in 1862, which concentrated on agricultural education at a high level, research and extension in Agricultural Colleges. Later, in 1887, other laws provided funds for establishing experimental stations and the Smith Lever Act of 1914 provided additional federal funds to reinforce agricultural extension as part of the Land Grant Colleges system (LGCs).

In the system, agricultural research, extension and training are given similar status and many times they share the same personnel under one institutional umbrella. Trainers also have research and extension responsibilities. Researchers also practise extension. Even the most specialized extentionist could also work in research (Mc. Dermot, in Christoffersen, 1984) and browse continuously through experimental station fields, libraries and offices.

The success and contribution of the LGCs to the agricultural development of the US, during more than 50 years, motivated initial attempts to transfer the system to developing countries at the end of World War II. In doing so, the initial conditions which made the system successful in the US were usually forgotten. These were:

a. The extension services, agricultural education at a high level and research were established to satisfy the manifested interest of the beneficiaries; i.e. they responded to a definite and effective demand by farmers for clearly defined services.

b. The beneficiaries had: 1. a high level of literacy, 2. a high entrepreneurial capacity, i.e. the ability to use production resources and knowledge effectively.

c. The state of development in the agricultural marketing and input distribution infrastructure was sufficient to entice producers to take the risks inherent in the adoption of innovations in production.

d. The administrative and political establishment was able to provide the required institutional support, which was well complemented by a concentration of the private sector business in agriculture.

e. The farmers themselves, already organized, lobbied well in front of the decision makers, which was reflected in the 'great interest of the US politicians for the well being in the rural sector' (Saravia 1983).

Furthermore, the efforts to transfer the system to developing countries have been piece-meal in fashion. They have occurred under very privileged administrative autonomy, with specific and strong support - usually foreign - and the strategic selection of tasks. Preference has been given to extension coverage.

Once the foreign technical and financial support has ended, the units and methods introduced have been assimilated into the local bureaucracies, usually within the Ministry of Agriculture. Facing now similar limitations, the new institutional branches have not fared better than other more traditional ones and their initial image has deteriorated. The initially trained personnel have left and have been replaced with less qualified personnel, thus limiting capabilities further.

Latin America

Research and technology transfer activities have been practised in Latin America since the second half of the XIX century.

Until 1930s, the conceptual and institutional difference between research and extension was minimal (Martinez 1989). The introduction of technology was mostly supported by farmers' associations, who also supported the contemporary development model based on production for export markets. Some of those associations are still influencial today.

The following period, 1930 to 1950, was characterized by a proliferation of governmental institutions and accumulative growth in state functions. This was prompted by the beginning of an inward looking development drive across the region, caused by the closure of international markets in the wake of the 1929 financial crisis, which rendered the existing export-driven development model inoperative.

During this period, research and extension were in some cases all public and in others they received significant

contributions from farmers. Furthermore, foreign assistance began to play an important role during the 1940s.

As in the pre 1930 period, during 1930-1950, there was still little or no interdependence between research and extension. Technology was believed to be available, while the constraint was identified as the absence of rural institutions oriented towards motivating, organizing and informing farmers (Rice 1971, in Martinez 1989). Linkages, under this conceptualization, were not a problem.

Later, during the 1950-1970 period, the Latin American development model was based on industrialization, for import substitution, and strong central planning. The institutional arrangement became even more complex and the government continued to be seen as the spearhead of development.

Governments became also concerned with the overall reorganization of research and extension activities. Awareness that many problems derived from weak or non existing links between research and extension grew. The two activities were now seen as sequentially interdependent, with extension being responsible for transferring the results of research to farmers. Extension services established with US support were initially incorporated into the central administrative structures. Later, however, other decentralized, semi autonomous institutes began to be established.

With some variants in organization, the following semi-autonomous institutes were established: INTA (Argentina, 1957), INIAP (Ecuador, 1959), INIA (Mexico, 1961), ICA (Colombia, 1962), INIA (Chile, 1964), and EMBRAPA (Brazil), FONAIAP (Venezuela), IBTA (Bolivia), ICTA (Guatemala), INTA (Nicaragua) and INIA (Peru) during the 1970s (Trigo 1982).

These institutes included national research centers responsible for basic research in selected themes, and a network of experimental stations and extension agencies oriented to applied and adaptive research and to the transference of new technical knowledge. This structure intended to integrate -institutionally - the different phases of the process of generating and transferring technology in response to the problems of production in different areas and groups of farmers. In time, some of these institutes have began postgraduate training as part of their responsibilities.

During the 1950-1970 period, however, Latin America witnessed a big drive of agrarian reform and rural development policies. They placed extension activities in a new context of responsibilities. New and many times experimental institutions were created. In some of them, extension was included as an additional function. This led to new concepts of extension activities. They focused more on social and organizational factors: extension was no longer sequentially related to research. A reciprocal interdependence was evident, with extension providing research with important inputs for identifying problems and defining priorities.

The new functions assigned to extension made it more interdependent with the other development activities, multiplying its potential influence but also diluting the technological content of its work.

The additional responsibilities did not mean additional resources for extension. At best, the number of officers was increased but the per-capita resources for training, salaries and operation was less. Furthermore, the integration of added activities became problematic and coordination through planning proved inadequate.

The industrialization based development model was in vogue up to the early 1970s. By the mid 1970s, however, social unrest in some of countries, energy crisis in others, and changing conditions in foreign markets for most, precipitated a crisis that was aggravated by an accumulated, huge foreign debt. Latin America is still fighting this crisis today.

Governments grew less able to control the implementation of state policies and began to abandon aspirations to plan everything. Declining state resources and the weakness of the central decision making authorities slowed or stagnated the development of public research and extension. The reaction was a greater, centralized but differentiated control from the highest governmental levels. This restricted further the research and extension

interaction and their effectiveness. Lower Rs and Es effectiveness implied less attention to the interests of powerful farmers' associations which diminished their support.

All the above was aggravated by the diversified nature of Latin America agriculture and the predominance of smallholder producers with no capability to voice their technical demands.

However, a promising development of alternative sources of technology began during this same critical period. They included such old groups as the Colombian Coffee Growers' Federation (1927) and newer ones like the Rural Consortia for Agricultural Experimentation (CREA) in Argentina, as examples. Farmers' Associations, non-governmental development organizations (NGOs), private input companies and International Agricultural Research Centers, all increased their participation.

Still, the private sector tended to benefit the better endowed farmers. When these farmers do not find adequate response from the state to their specific technology requirements, either because their aim differs from that of present policies or because they cannot influence the research orientation, they set their own services (Kaimowitz 1988 and Pineiro 1983, in Martinez 1989).

The private sector has been providing examples to the government in terms of methods and organizations to improve services (Pineiro 1986 and Pray and Echeverria 1989). Normally, the contrary is expected.

Today, Latin America continues its search for better coordination between Rs and Es and with other relevant groups. The dialogue has included debates on what extension means (education or technology transfer), what its goals are (empowerment, acquisition of a new set of values, or attitudinal change), who it is for (the farmer or the rural family), and how it is to be carried out (individually, through farmer groups or through mass communication). Should a fix model exist for all of Latin America, or even for a particular country as a whole?

The debate has continued up to the point where the term extension is being abandoned. Greater emphasis is being given to technology transfer in this context and in defining new institutional mechanisms. In Chile, for example, INIA has followed the example of the CREA private groups in Argentine by creating the GTTs (Grupos de Transferencia Tecnologica) groups for technology transfer. In each of these groups, farmers exchange their experiences and technologies with each other by meeting on a rotational basis in one of the member's farm. Initially, they are helped by an INIA extension officer. Researchers also participate in these exchanges by special invitation to deliver lectures, other specific activities, or by receiving notification on the groups suggestions/requests for research or technical advice. Once a group can operate with minimal support, INIA partially disengages from it.

Asia and Africa

In Asia and Africa, the colonial powers established research institutions to increase the production of high-value export commodities (Sims and Leonard 1989). This complemented other efforts by policy makers to encourage the production of export commodities. The favored beneficiaries were foreign settlers and companies, and indigenous landed elites. Such producers were eager for technical innovations which would increase their profits, and they established a close relation with researchers.

The close researcher-producer relation other channels to popularize innovations made unnecessary. Scientists felt stimulated and developed knowledge relevant to their prime clients. When peasant farmers were part of the export producers, the relation of the scientist with them tended to be top-down and coercive.

Eventually, the need to provide food to a growing population and to face the threats of famines in populous colonies forced the development of scientific findings for a broader clientele and wider dissemination. This occurred first within British and then among French colonies.

British colonials generally charged a Department of Agriculture with the extension responsibilities of translating research findings into simple language for mass audiences. There was a strong element of coercion in some extension activities, including soil conservation efforts and resettlement programs. Separate bureaucratic agencies attended to crops and animal husbandry with no integration with one another or with research bodies (von Blackenburg 1984, in Sims and Leonard 1989). The French established semi-autonomous parastatal agencies responsible for particular crops. In them, research and extension were more integrated, but the concern with the needs of subsistence food producers was even less.

The integration of research and technology transfer for subsistence crops was impeded by marked differences in status between professional researchers and technology transfer agents, and between the latter and the producers. Those with subordinated status were seen as passive recipients of information. Extension staff were expected to promote modern European farming practices, not to interpret the farmers' world to researchers (Sims and Leonard 1989). Of course the research results promoted were seldom relevant to the rural majority who relied on informal research and technology transfer between each other. Extension agents were often held accountable for assignments not necessarily related to agriculture.

Recently in Africa, as in Asia and Latin America, several institutional arrangements and operational methodologies for Rs and Es have been entertained. This has been usually tied to foreign influence, both technical and financial.

The Training and Visiting extension method has been promoted by the World Bank. USAID, IDRC, other donors and the International Research Centers have promoted the Farming Systems Approach and related On-Farm Research and Adaptive Research. These approaches were promoted mainly to address and serve the 'small holders' community of farmers. Success has been mixed and usually as temporary as the external support provided. Even though most countries have made notable efforts to internalize the positive lessons of the experience and elements of the models tried into the national structures, few self sustained cases have resulted. Lack of resources is the common explanation. The critical period is at the end of the external support. What appears missing is a previous commitment, both at the national level and particularly within the Es and Rs quarters, to maintain the momentum until a working national scheme is developed. When that commitment exists, a shortage of resources to be faced at the transition period can be anticipated and probably prevented.

The private sector is also reappearing in the African Rs and Es scene. One representative is the British and American Tobacco Company in Eastern Africa which favors a commodity centered approach with strong credit and input distribution support (Christoffersen 1984). Several Non Governmental Development Organizations, usually externally financed, are also operative. Furthermore, all International Agricultural Research Centers are giving high priority to their work in Sub-Saharan Africa.

The task ahead

The challenge ahead is at least as complex as that faced by Rs and Es throughout history. Rs and Es have to become more effective and efficient because resources are likely to continue being restricted. Their actions, besides being consistent with the national priorities, need to be attuned to and complementary with those of the emerging private sector. The contributions of the IARCs are also important in this respect.

Further, agriculture has taken a renewed importance for development, particularly in Sub-Saharan Africa. This implies a renewed importance of agricultural technology for the development of agriculture, i.e. the work of Rs and Es.

Most likely, public Rs and Es will continue to be responsible for attending to the resource-poor farmers. For this group, agronomic research of the most pure type may still be the most important element on the road towards agricultural modernization. This is until they, by their own development or by that of the agricultural support

system, are able to adopt more sophisticated and powerful technologies - known as of the 'embodied'[1] type; namely mechanization, improved seeds and agrochemicals (Pineiro 1986).

Organizationally, the tendency is to decentralize the joint R and E activities to cover the different regions, commodities and type of farmers. Experiences in Colombia indicate that placing agricultural research and technology transfer in the same institution is neither a necessary nor a sufficient condition for effective coordination (Kaimowitz 1989).

Other efforts to increase the relevance and responsiveness of research and to improve its links with extension include conducting on-farm research and redesigning the functions of the experimental stations. However, the present organizational structure and centralized coordination mechanisms seem to limit the flexibility and effectiveness of such efforts.

All the above are general trends which take on specificity in each country and region within and along time. These general and specific trends ought to be internalized by the structure and behavior of the Rs and Es work to ensure good performance. This requires collaboration based on understanding through dialogue which in turn requires proper linkages. Linkages are thus a means to a superior end.

To insist on this is not to suggest that nothing has been done or advanced. Rs and Es are both aware and have been interacting. What is needed is to improve on what already exists.

A series of surveys reported by ISNAR (Seegers and Kaimowitz 1989) show that Rs and Es interact through meetings, training events, publications, joint participation in trials and demonstrations, and direct personal contacts. Communication was more active in the case of R and E systems qualified as more developed and commodity-specific. Furthermore, these more developed Rs and Es groups communicate mostly informally and give greater importance to joint research-extension trials.

Further, the surveys show that, in the case of crops, new varieties and crop protection are the major foci for interaction. Crop protection is usually perceived as urgent in the demands for research by farmers and extension workers. Rarely are other long-term, less-obvious problems emphasized.

The Es, classified as more effective, are also acknowledged as having had inputs into determining research problems. Surveyed researchers, in most cases, expressed doubts about such inputs but were willing to give those ideas qualified support. Extensionists in general feel competent and want to provide such input.

The survey evidence, even among the more developed Rs and Es systems, suggests that extension will probably never replace researchers as a source of research ideas. It appears that only a minority of extension agents is likely to be involved.

Apparently, one of the most important reason for the lesser communication between researches and extension workers in developing countries is the negative attitudes they have about each other. Researchers doubt the competence and motivation of extension workers, whereas extensionists question not the researchers' technical competence but the relevance of their research.

Extension workers want researchers to put more efforts into communicating their findings. They also want simpler, more timely and applicable materials, written in their local language and greater efforts made to give field-level workers access to such publications. Research journals are not an effective means of communicating with extension.

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[1]Embodied technologies—technological elements which in themselves contain (embody or are the result of) previous research and technologies, e.g. hybrid seeds.

It is apparent, from the survey, that to improve relations between the two groups, researchers will have to perceive extension agents as competent. In most cases, this requires more training and incentives for extension staff. For its part, research needs to be more relevant, through greater emphasis on farmers' constraints, more on-farm research, and greater input from farmers and extension.

Clear channels and procedures are needed if extension input into research is to increase. To produce more and effective materials for extension, more resources for research communication departments and incentives for researchers to attend to this task are needed.

Informal, direct person-to-person communication is probably essential for an effective flow of information. This is consistent with evidence from communication research elsewhere. It is, however, a challenge in developing countries where extension services are organized along hierarchical lines, extension workers have limited education and there are great salary differences between researchers and extension workers.

Finally, the historical and survey review done indicate that in establishing more effective interaction between extensions and research, the following appear as key areas: the use of financial and material resources, evaluation criteria and personnel management.

Links at the local level require flexibility in the use of resources. Institutional mechanisms should provide for this. New evaluation criteria which combine relevance, adequacy and transferability, satisfying the requirements of both research and extension are also needed.

The critical elements are the policies which affect salaries and career development differences between researchers and extensionists. The initial model intended for Latin America called for similar conditions for both partners in a common task. Tables 1, 2, 3 and 4, given as annexes, list: administrative linkages, direct service linkages, barriers to coordination and facilitators to coordination, respectively. They appear to be an important input in the context of this paper.

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Annex Table 1. Administrative linkages to promote coordination.

Linkages	Examples
1. Fiscal	
a. Joint budgeting	Organizations decide jointly how their funds, or funds to be made available by others, will be used.
b. Joint funding	Several organizations agree to jointly fund a project.
c. Fund transfer	One organization transfers its funds to another which uses them in a jointly approved program.
d. Purchase of services	One organization contracts to provide services that are paid for by another organization.
2. Personnel Practices	
a. Consolidated personnel	The same administrators supervise the activities and personnel in two or more units formerly supervised by others.
b) Joint use of staff	One staff provides services for more than one organization.
c) Staff transfers	Staff from one organization moves to another to allow them to work on a project.
d) Staff out-stationing	Organizations place some of their staff closer to the client or where the coordinated work is to be done.
e) Co-location	Staff from two or more organizations are located in the same facilities.
3. Planning and Programming	
a. Joint development of	Administrators from several organizations jointly agree on policies for clients.
b. Joint planning policies	Administrators from several organizations jointly select programs and services.
c. Joint programming	Administrators jointly develop the program content and delivery of program content to clients.
d. Information-sharing	Informal discussions, exchanges of newsletters, open houses, etc. held to provide information to other organizations.
e. Joint evaluation	Personnel from several organizations work together to jointly evaluate the services provided.
4. Administrative Support Services	
a. Record-keeping	Relevant records on clients and services are maintained by staff in one location and made available to participating organizations.
b. Grants-management	Activities funded through grants and records of fund allocations supervised and maintained by staff in one location for all of the participating organizations.
c. Central support	Services needed by all of the organizations such as typing, printing and accounting are provided by some staff members for all of the organizations. Each organization may contribute funds to pay for the services provided.

Annex Table 2. Direct service linkages to promote coordination.

Linkages	Examples
1. Core Services	
a. Outreach	Organizations agree to station some personnel closer to clients to make services more available.
b. Intake	Organizations agree as to which clients they will serve.
c. Diagnosis	Organizations agree as to what kinds of problem they will diagnose or discuss with the clients.
d. Referrals	Organizations refer clients to other participating organizations when needed.
e. Follow-up	Organizations agree to check later on clients' progress or additional needs that develop.
2. Models of Case Coordination	
a. Case conference	Representatives of organizations working with the same clients discuss programs and client needs.
b. Case coordinator	A person, or an organization, that acts as a 'coordinator' encourages the exchange of information and joint planning for clients served by the organizations.
c. Case team	Several organizations provide a staff member to work on a team to better meet the needs of clients.

Annex Table 3. Barriers to coordination

Barriers	Examples
1 Threat to autonomy	Members fear that coordination will reduce freedom to make decisions and run their programs.
2. Professional staff fears	Professionals fear loss of freedom. They may be committed to different ways of working with clients.
3. Client representatives	Fear that these persons will try to dominate the organizations that service the clients.
4. Disagreement among resource providers	Persons or groups providing resources disagree about client needs and services to be provided.
5. Multiple local governments and many private and public organizations	Coordination is complicated if too many organizations are involved
6. Lack of 'domain concensus'	Disagreements among the organizations regarding the right of one or more organizations to be involved. Disagreements about which organizations should: 1) function in which geographical areas, 2) provide which services, 3) to which clients.
7. Different expectations from federal, state and local levels	Different expectations exist with regard to which clients should be served and which services should be provided.

Annex Table 3. (contd.)

8.	Coordination is a low priority	Participating organizations don't really think that coordination is needed.
9.	Costs and benefits are uncertain	Staff in organizations think the costs of coordinating will be too high or that program costs will be too high.
10.	Resources not available	An organization would like to participate but doesn't have resources to use in the coordinated effort.

Annex Table 4. Facilitators to coordination

	Facilitators	Examples
1.	Domain consensus	Organizations agree that each is legitimate with regard to: 1) the geographical areas to be served, 2) the services to be provided and 3) the clients selected.
2.	Organizations have comparable objectives and functions	Organizations share an interest in the same problems and work with clients in the same way.
3.	Availability of funds tied to coordination	Organizations can get the needed resources only if they coordinate with others.
4.	Number of organizations kept to moderate level	Easier to promote coordination if the number of organizations and communities included is kept to a minimum.
5.	Awareness of interdependence	Organizations know they have interests in the same clients, are already coordinated in some ways, or can see that they need each other.
6.	Organizational activities are 'standardized'	Organizations that have developed a routine way of serving clients find it is easier to coordinate. It is easier for these organizations to reach an agreement about the jobs for each organization in the coordinated effort.
7.	Perceived crises	A threat to the clients served, to the community, or a common threat to the organizations encourages coordination.
8.	Informal ties between members and trustees	Trustees and members who belong to more than one of the organizations can encourage coordination and promote trust.
9.	Presence of common clients	Clients or advocates for clients who are already served by several of the organizations can encourage coordination.
10.	Service failures and unmet needs that cross common boundaries	If common clients have unmet needs that involve several organizations, organizations may see that coordination is needed. If several communities see that a common problem faces them, coordination is more likely.

Note: Tables 1, 2, 3 and 4 are from: Mulford, C.L. and Klonglan, G.E. 1981. Creating Coordination Among Organizations: An Orientation and Planning Guide. North Central Regional, Extension Publication 80, SEA-Extension, USDA.

THE NEED FOR AND EVOLUTION OF POST-INDEPENDENCE RESEARCH AND EXTENSION LINKAGES IN ZIMBABWE AND WHAT AGRITEX AND DR & SS EXPECT FROM COFRE

S. Pazvakavambwa
Director, AGRITEX

Introduction

Since well prior to independence, Zimbabwe has been known for excellent agricultural research and extension services. However, due to the pre-independence policies of separate development, research and extension catered mainly for the commercial farming sector. The communal or small farm sector was only a secondary beneficiary through the goodwill of a few individuals or by some uncalculated accident. There as no deliberate government effort to support or direct research to solve the problems faced by the smallholder farmer and extension for smallholders was basically a demonstration of technology already adopted by commercial farmers so that the few 'enlightened' communal farmers could take up the challenge. Usually these demonstrations were carried out by the extension worker with very little evaluation.

The fact that a strong extension base was established separately from the research base can best be explained by the professional rivalry that existed between the then Department of Conservation and Extension (CONEX) (for commercial farmers) and the Department of Native Agriculture (for smallholders) and its successors, namely, the Ministry of Internal Affairs and the Department of Agricultural Development (DEVAG), prior to the merger between DEVAG and CONEX in 1981. To a large extent, the professional rivalry challenged those that worked in the extension service for the communal areas to develop an extension system that would match that of CONEX in quality and strength. Thus the origins of the extension service as it is known today arose out of professional rivalry. CONEX enjoyed very close informal or personal links with research, largely because both research and the extension effort from CONEX was directed towards the same beneficiary, the large scale commercial farmers.

There was no formal link between research and CONEX before independence. The fact that both the Department of Research and Specialist Services (DR & SS) and CONEX belonged to the same Ministry may have been the reason why no formal linkage was felt necessary. While extension responsibility in communal areas was always in a different Ministry, it was the branch of the extension service which was the first to establish a formal link with research, in order that some of the problems faced by communal farmers might thereby be addressed by research. Even so, this linkage was not established until just after independence (1980).

Extension in the communal areas concentrated on technology transfer, result demonstration, adaptation and adoption by the innovative farmers. Any links with research were through the few extension officers that felt 'challenged enough' and made visits to the research stations, or researchers who felt the urge to venture into the communal areas despite all the well documented and chronicled problems associated with such a zealous effort. Some useful work was however done in communal areas, although it soon became evident that, contrary to what had been expected, research results from communal areas continued to gather dust on the scientist's shelves because little progress was made beyond basic research. The main problems could be summed up as follows:

a) Absence of a specific budget for communal area research.

b) Lack of a research/extension linkage through which researcheable problems could be channelled.

c) Division of responsibility for extension according to the farming sector.

d) No policy from government directing research effort to communal areas.

e) Competition between the two extension services, namely, CONEX and DEVAG.

f) Lack of awareness of the importance of the communal farmer and his potential to contribute to the national economy.

g) Fixed opinions on the part of some of the researchers of the day.

The merger of the extension services

After independence, in 1980, the government soon realised that it could not afford the luxury of one extension service for each of the two different farming sectors. A directive was, therefore, given to merge the two services, DEVAG and CONEX, into one national extension service that would serve the needs of all farmers. The merging process took 15 months and the resulting Department of Agricultural and Technical Services (AGRITEX) became operational in July, 1981 after protracted and complex negotiations. The greatest benefit from the merger was an accompanying directive which stated that the new extension department, though national in character, had to focus specifically on the communal areas and the new resettlement areas. This meant that the research base upon which the strength of the former CONEX lay had to be extended to the communal areas. Thus the research department (DR & SS) had to respond to this new adjustment by initiating research for communal farmers in order to meet the government directives.

However, neither the extension of the research base nor the response of the research department could be effectively done without a formal link between research and extension. Although it was evident that there was a need for the establishment of a formal linkage, earlier efforts did not meet with much success. The two aspects that made the establishment of a formal linkage possible were:

a) The Farming System Research Unit which was established in the Department of Research and Specialist Services after independence and

b) The World Bank funded 'National Agricultural Extension and Research Project'.

These two initiatives assisted earlier efforts and gave prominence to the need for close co-operation between researchers in DR & SS and the Subject Matter Specialists in AGRITEX. Such efforts resulted in the formalisation of the Committee for On-Farm Research and Extension (COFRE) in 1986. COFRE has had a few short term achievements, although much remains to be accomplished.

The research-extension continuum

For many years, the research effort in Zimbabwe is best described as 'basic and highly scientific'. The testing of hypotheses and the scientific manipulation of genes and hormones formed the professional approach to research, which was largely 'on- station' with an incredibly high degree of control. Thus research existed in a perfect biological world; a world devoid of socio-economic interactions. As a result, research findings were often idealistic and there was a large gap between technology performance based on research findings and subsequent application even by the best farmers. The gap for smallholders was unacceptably large. The need to take into account the low soil fertility, power resource limits, cash constraints etc, of smallholder farmers, became more apparent and some off-station trials became popular. These were either farmer-managed or researcher-managed. This then formed the humble beginnings of on-farm research.

There was no basic research done for communal areas under their sandy soil types, weedy conditions etc. The best that research could do was to carry out a demonstration of results from on-station work or observation trial. Thus communal area practices or recommendations were mirror images of what had been tried and tested for the commercial areas and the poor performance of those technologies was blamed on the lack of management expertise. This need to do more appropriate research and extension in communal lands, therefore, forms the basic centrepiece for COFRE.

The switch to address the needs of smallholders called for change in outlook and attitude on the part of the many actors involved. To begin with, a whole new concept of research had to be defined and popularised. Adaptive research or any research that deviated from the scientific norm was viewed as 'not challenging enough' and tended to be relegated to the background.

In order to establish a solid research-extension linkage, the following conditions had to be met:

a) There had to be a relaxation of line management requirements to allow direct contact between research and extension personnel.

b) Direct contact between research and extension personnel had to be monitored in order to produce results.

c) An effective operational arrangement had to be set up; one that would dispense with administrative bottlenecks.

d) A budget to service the research-extension linkages had to be established.

e) A list of research agendas that would involve both research and extension personnel had to be developed. The process of evolving suitable research agendas has been established, but these require close monitoring and supervision, if the results are to be useful.

f) The research extension linkages had to be institutionalised. To a very large extent, the above conditions have been met, though not to the same degree of satisfation. COFRE sub- committees have been established in a number of subject matter areas, although effective functioning is still to be achieved. The challenge that lies ahead is to make COFRE a significant feature of the activities of both research and extension.

Expectations of DR & SS AND AGRITEX from COFRE

The activities of COFRE should help improve the following areas of research and extension:

a) Specific recommendations based on environmental and resource endowment.

For some time now, blanket i.e. national recommendations for fertilizer and other inputs have been given. A wide and, at times, unacceptable level of variability has been noted, rendering the recommendations almost meaningless in some areas, especially semi-arid areas. COFRE should be able to develop a spatial network of trials that is specific to the environment and the resources available within that environment.

b) Methods for problem analysis in small farm enterprises.

At present, there is no established system of analysis for small farm enterprises, but such a system can be developed and COFRE is in the best position to do this. The methods should enable rapid appraisal of smallholder agriculture and may enrich the adaptive research trials which are often difficult to prove their merit.

c) Most research trials, observation trials or demonstrations, have not incorporated economic or financial analysis. As part of an on-going programme, COFRE should incorporate economic analysis in appropriate trials and in all demonstrations. Such an analysis will help explain why farmers made certain decisions.

d) There should be developed some form of risk research. Most small farmers have been hesitant to go into certain ventures, although the projected benefits may be large. COFRE should develop an approach to

risk assessment which will help explain and convince smallholder farmers to go into programmes that have a high economic return although they may be risky to begin with. The fact that small farmers make decisions specifically to minimise risks is a reflection of a lack of research thrust and results in this area. Hopefully, this form of research will help identify those small farmers who have a high enterpreneurial ability and who could lead the way. It should also point to research on technology that is perceived as less risky by farmers.

e) COFRE activities should create a data bank of communal area research and demonstration project results. At present, no such bank exists; however, the trend in the country points towards a growing small holder agricultural sector and this data bank will be useful for the future.

The above expections do not by any means suggest that research in large scale agricultural operations should be slowed down. On the contrary, it must continue, as it is the reference point for what is currently happening in the small farm sector.

Conclusion

Perhaps it is too early to expect COFRE to have made strides in the on-farm research field. Indeed, there are obstacles to be overcome. However, COFRE has laid a strong foundation to justify the process of developing other structures that will rest upon that foundation. The future achievements of COFRE will be attributed to all of us. However, in order to realize such achievements, every single one of us must play his role.

Discussion on paper

Rapporteur: O.T. Mandiringana
Discussant: R.J. Fenner

The following points were noted:

a) The potential contribution of the smallholder agricultural sector to the national economy is over-looked by some people.

b) More research should be directed towards the more marginal farming regions of the country (Natural regions III to V).

c) The influence of farmer management should be regarded as a very important factor in technology generation and not merely as statistical 'noise' in experimental designs.

d) Close monitoring and supervision of on-farm projects should be an on-going exercise that has to be taken seriously.

v) Adaptive research, although scientifically simple, should be encouraged.

e) It will understandably take a long time to move from the general to the specific on the question of recommendations in communal areas because of their diversity in physical and socio-economic environments.

g) The need for an economic analysis of on-farm project results cannot be over-emphasized and COFRE should play a major role to facilitate this.

h) The role of COFRE to date cannot be underplayed and its continued existence as an entity has been noted by other countries where research-extension linkages have not faired well.

General discussion

1 The need for an effective data bank of on-farm research and demonstration results was re-emphasized and it was pointed out that all relevant data should be analysed and documented.

2 An important factor for the success of on-farm projects is the cooperation of the extension worker who facilitates their field implementation. It was agreed that training and leadership by example would be very important in fostering commitment by staff members at all levels in both departments. Also of importance would be the involvement of all concerned parties at every stage, from planning to the evaluation of projects.

3 Concern was expressed at the lack, in some cases, of a coordinated approach to on-farm trials among institutes and stations within DR & SS. An interdisciplinary approach whereby individual institutes work together was proposed to be formally instituted once the reorganization of DR & SS along commodity rather than disciplinary lines is effected.

THE PERFORMANCE OF COFRE DURING THE LAST FOUR YEARS AND SUGGESTIONS FOR IMPROVEMENT

E.M. Shumba
Chairman, COFRE

Introduction

Before national independence in 1980, the government's agricultural policy was biased towards large-scale commercial farming and hence most of the research and extension effort was directed to that sector. Furthermore, the ability of farmers in this sector to clearly identify and communicate their production problems and to readily interprete research results and extension messages considerably simplified the problem of research and extension linkages. Also, formal linkages were achieved by keeping Subject Matter Specialists from the Department of Conservation and Extension (CONEX) on research stations of the Department of Research and Specialist Services (DR & SS) to facilitate closer interaction with the researchers. However, no parallel setup existed in the communal areas where the Department of Agricultural Development (DEVAG) was responsible for the extension function. Thus, when the government directed that DR & SS and the newly created Department of Agricultural and Extension Services (AGRITEX) intensify their research and extension activities in communal areas after 1980, no formal linkage mechanism between the two departments existed. This had two adverse implications:

First, AGRITEX could not use their local experience to influence technical problem areas addressed in DR & SS on-farm trials.

Second, DR & SS could not influence the technical content of demonstrations conducted by AGRITEX. The situation was worsened by DR & SS institutes and stations that independently approached AGRITEX for on-farm trial sites.

This had the following effects: AGRITEX was over-burdened by requests, resulting in a lot of frustration among district officers and field level extension workers. Also, there was considerable duplication of research effort and an inefficient use of scarce resources like vehicles through uncoordinated trips. Thus, even within DR & SS itself, the need to improve resource use efficiency by creating a more intergated research approach to priority problems in communal areas became apparent. These difficulties were largely the stimulus for exploring ways to establish and strengthen linkages with AGRITEX. To this end, several approaches which culminated in the formation of the Committee for On-Farm Research and Extension (COFRE) in 1986 were tried with varying degrees of success (Fenner and Shumba, 1989).

The overall objective of COFRE is to coordinate on-farm research and the demonstration activities of DR & SS and AGRITEX through commodity subcomittees at the national level and Regional On-Farm Research and Extension Committees (ROFREC) at regional and provincial levels (Fig 1). Specifically the committee seeks to:

a) Encourage the conduct of on-farm research and demonstration projects in communal areas.

b) Set on-farm research and demonstration priorities with emphasis on marginal rainfall areas (Natural regions III to IV).

c) Facilitate the sharing of results from trials and demonstrations through interactions and the creation of a data bank on projects.

d) Review and improve upon on-farm project proposals submitted by DR & SS and AGRITEX staff.

e) Promote the testing of new recommendations on farmers' fields through verification trials by interdisciplinary teams of research and extension officers.

f) Monitor the progress of on-farm research and demonstration projects and recommend improvements in their management.

To what extent COFRE has achieved these objectives over the last four years is examined below.

Achievements of COFRE

Although COFRE has been in existence for four years only, its achievements have been considerable.

First, the success of COFRE, especially in crops, can be easily seen from the increase in the number of projects and project sites planned in 1988/89 compared to 1987/88 (Table 1). This increase can be attributed to the incorporation of new projects recommended by commodity subcommittees and ROFREC. In this regard, COFRE has provided a short cut in communicating research results and priority technical areas for inclusion into demonstrations and trials respectively. Normally AGRITEX receives such information through DR & SS Annual Reports which, owing to publishing delays, can be over two years behind. On the other hand, DR & SS previously relied on the individual researcher's 'wisdom' to source research topics for on-farm trials. However, there was an overall decrease in the number of projects and sites planned in 1989/90 compared to 1988/89 mainly because of budgetary constraints in DR & SS and transport shortages in AGRITEX.

Second, there have been improvements in the prioritization of enterprises and technical areas addressed in on-farm projects. This is in line with the recommendations made at a workshop on 'Setting research and demonstration priorities for natural regions III to V' held in 1987 (DR & SS and AGRITEX, 1987). Table 2 shows that the number of projects on small-grain cereals, horticulture and production systems increased in 1989/90 compared to 1988/89. This is reinforced by Table 3 which uses maize (a crop that featured prominently in the 1987/88 projects largely because of its importance as a starch source in communal areas) to illustrate the shift in project emphasis towards small-grains, oilseeds, horticulture and production systems in 1989/90. The objective of the small-grain cereal projects is to guarantee food security for households in low rainfall areas. In this regard, there has also been a renewed interest in the utilization of vlei areas by initiating on-farm research on the production of wheat and rice on residual moisture. Diversification into horticultural and oilseed crops is aimed at producing technologies that generate cash at the household level.

On the other hand, the increase in demonstration proposals dealing with the introduction of new enterprises like castor, protea and with holistic resource management is very encouraging despite the apparent absence of a supporting on-farm research component. In some instances, this has forced AGRITEX to demonstrate technologies that have not been adequately field tested by researchers. The thrust on production systems such as rotations, intercropping and soil fertility is in recognition of the role improved crop husbandry practices can play in increasing and sustaining crop productivity and production in communal areas. However, the number of livestock projects (especially from DR & SS) has been disappointingly small (Table 1). This has been largely attributed to budgetary problems and the complexity of conducting on-farm research with livestock.

Table 4 shows the distribution of projects according to technical areas addressed. There were more projects on moisture conservation techniques and soil fertility management in 1989/90 than in 1988/89. This is confirmed by Table 5 which shows that, although more projects were on crop varieties in 1987/88, there was a shift towards studies on moisture conservation, soil fertility, crop protection and other husbandry practices in 1989/90. The increased emphasis on moisture conservation demonstrations and soil fertility-related work is in recognition of the importance of low rainfall and poor soil fertility as major constraints to achieving high crop yields in communal areas. However, the apparent absence of a matching research emphasis on moisture conservation techniques is somewhat worrying given previous research that shows the inconsistency of yield benefits from planting a crop on ridges or furrows on sandy soils.

Third, although the vetting of project proposals at either the provincial or Institute level has sometimes been weak, considerable progress has been made to improve on-farm project design and implementation over the

last four years. For example, most demonstration projects have been simplified to two treatments consisting of the farmers' practice and the improved technology, each on a 0.1 hectare of land. Also, guidelines in the form of a manual on the design, management and evaluation of demonstration projects are being prepared by COFRE. With regard to trials, the number of treatment combinations included has been reduced and emphasis is now on the inclusion of the farmer's practice as the 'control' treatment. Furthermore, the reorganization of previously scattered sites into 'clusters' has helped some institutes to improve the quality of data generated and reduce the costs of running such projects.

Finally, COFRE commodity subcommittees have synthesized available research information into tentative technical recommendations for the production of several field crops in different agro-ecological regions of the country. These recommendations will continuously be reviewed in order to incorporate new information from on-farm or on-station projects. The viability of these recommendations is assessed through verification trials jointly run by AGRITEX and DR & SS at the ROFREC level. This verification exercise was initiated in 1988 with work on maize in Masvingo and Manicaland provinces.

Challenges facing COFRE

Despite the highlighted successes, COFRE faces several challenges. First, although there has been an increase in on-farm project proposals submitted to COFRE since 1987 (Table 1), the percentage of projects that are successfully implemented has been unsatisfactory: only about 50 percent of the projects planned by either department are successfully implemented each season. AGRITEX largely attributed this to late input deliveries from their Head Office and drought experienced at some sites. In the case of DR & SS, this problem was more pronounced in 1989/90 when more than 60 percent of the proposed projects and project sites were either not planted or were abandoned due to budgetary and transport constraints. In the light of these problems, COFRE has recommended that: a) Input acquisition in AGRITEX be decentralized from Head Office to the provinces. b) Site selection in DR & SS be reorganised to adopt a coordinated cluster system to reduce transport costs by combining field visits across institutes. DR & SS should also design part of its on-station research programme with a farmer problem focus and then invite groups of farmers to visit such trials. This approach has already been adopted by a few institutes and stations.

Second, to date results from on-farm projects have not been compiled in a coherent manner and distributed to interested parties. This is probably because no directive was given as to whom results should go and in what format. To this end, COFRE has drawn up a standard form on which all on-farm project results will be reported. These results will then be forwarded to COFRE for compilation and distribution. To make such results more useful, COFRE intends to train DR & SS and AGRITEX officers in economic and risk analysis of on-farm project results.

Third, there is generally a one season time lag before subcommittee recommendations are incorporated into project proposals because project authors receive sub committee comments late relative to the start of the cropping season. This could be solved if the call for proposals was made earlier, around February each year.

Finally, because of budgetary constraints, DR & SS will increasingly be forced to spend its limited resources on those on-farm projects that AGRITEX perceives address the farmers' priority problems. To this end, the capacity of AGRITEX staff to source farmers' problems at grassroots level should be strengthened through diagnostic skills training. This is already underway.

Conclusion

Despite the highlighted shortcomings, COFRE has gone a long way towards fulfilling the objectives for which it was formed four years ago. This has been made possible by the dedication of men and women from both DR & SS and AGRITEX who continue to render voluntary services to the committee for the eventual betterment of the communal farmer. I hope that this meeting will take advantage of the perceived strengths of COFRE to

define additional responsibilities for it, while at the same time exploring ways to improve upon the committee's shortcomings.

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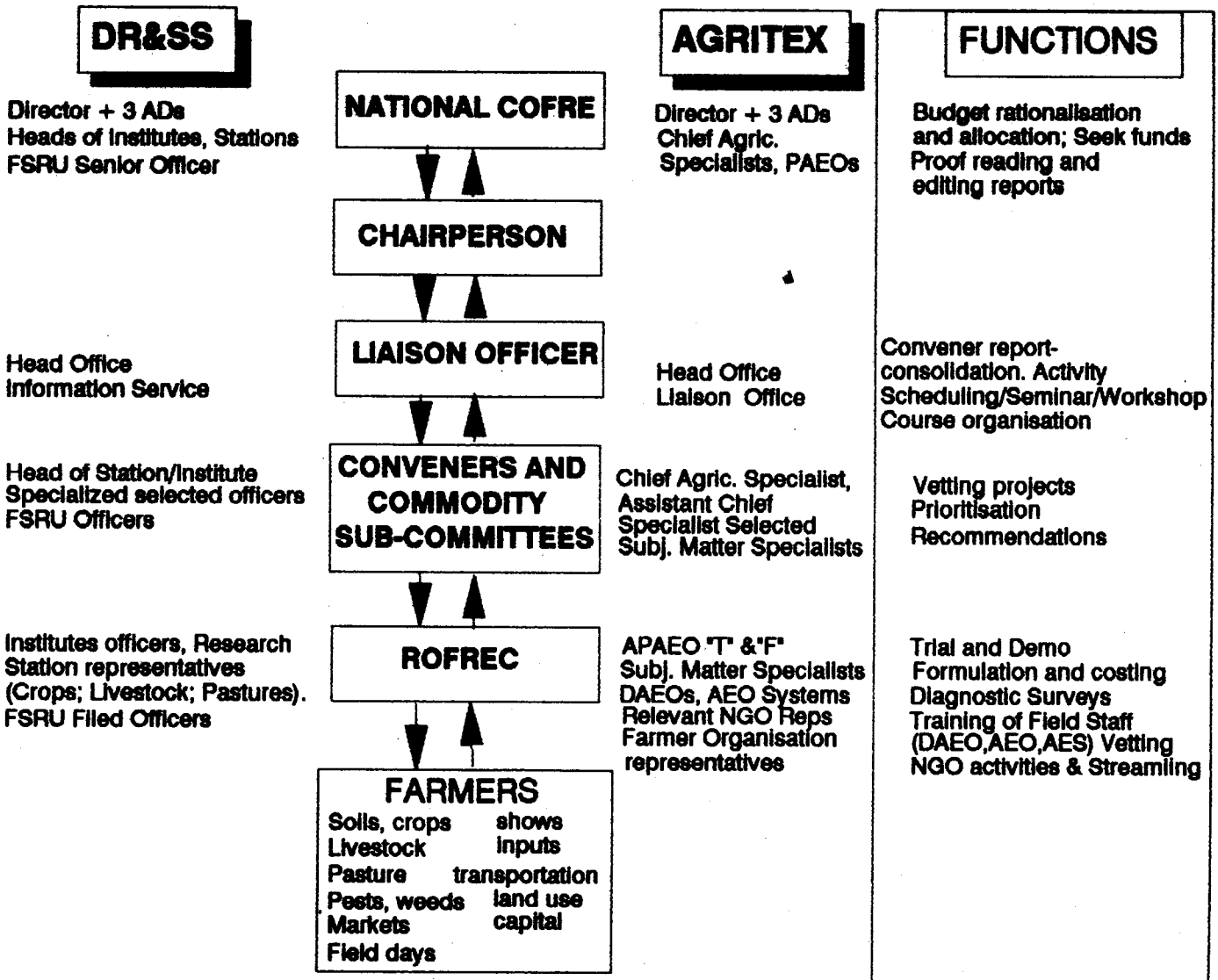

Figure 1. Function organogram for COFRE linkages.

Table 1, Distribution of on-farm projects and sites by Institute or Province: 1987 -1990

Organization	Projects (number)			Sites (number)		
	1987/88	88/89	89/90	1987/88	88/89	89/90
DR & SS						
Agronomy Institute	12	15	15	51	68	52
Crop Breeding Institute	5	4	4	61	55	23
Chemistry and Soils	8	7	7	26	31	24
Cotton Research Institute	7	6	6	84	83	53
Coffee Research Station	1	0	5	3	0	5
Farming Systems Research Unit	10	9	0	24	21	0
Lowveld Research Stations	5	5	5	11	18	18
Plant Protection	12	15	15	35	46	32
Livestock and Pastures	3	4	2	5	6	9
Total DR & SS	63	65	59	300	328	216
No. of sites/project				4.8	5.5	3.7
AGRITEX						
Head Office	5	5	3	27	15	6
Manicaland	27	38	25	58	137	75
Mash. Central	30	36	31	33	48	37
Mash. East	29	27	32	46	58	71
Mash. West	12	42	29	16	80	44
Mat. North	9	16	26	30	40	82
Mat. South	8	15	30	49	33	89
Midlands	34	35	23	78	61	46
Masvingo	11	10	7	35	18	17
Total AGRITEX	165	224	206	372	490	467
No. of sites/project				2.3	2.2	2.3

Table 2. Percent distribution of on-farm projects by enterprise: 1987–1990

Enterprise	Trials			Demonstrations		
	87/88 (n = 63)	88/89 (n = 65)	89/90 (n = 58)	87/88 (n = 165)	88/89 (n = 224)	89/90 (n =206)
Maize	17.4	23.1	15.5	18.2	23.2	15.5
Small-grains cereals	19.1	23.1	20.7	10.9	8.9	15.5
Oilseeds	33.3	32.2	24.1	44.9	44.1	43.7
Cowpea and beans	3.2	1.5	3.4	0.6	0.4	0.5
Horticulture	7.9	6.2	17.2	7.3	7.6	4.8
New Crops[1]	0	0	0	1.8	3.6	2.4
Production Systems[2]	11.1	12.3	15.5	5.5	4.5	8.7
Livestock and Pastures	7.9	1.5	3.4	10.9	7.6	8.7

[1]includes coconut, protea, bambaranut

[2]includes rotations, crop protection, soil fertility, intercropping, tillage techniques, regenerative agriculture

Table 3. Ratio of maize to other enterprises (based on Table 2): 1987–1990

	Trials			Demostrations		
	87/88	88/89	89/90	87/88	88/89	89/90
Small grains: maize	1.11	1.00	1.34	0.60	0.38	1.00
Oilseeds: maize	1.91	1.39	1.55	2.47	1.90	2.82
Horticulture: maize	0.45	0.27	1.11	1.11	0.33	0.31
Production systems: maize	0.64	0.53	1.00	0.10	0.19	0.56

Table 4. Percent distribution of on-farm projects (trials and demonstrations) by technical areas: 1987/88 and 1989/90

Study area	1987/881	1989/90 (n = 164)	(n = 205)
Crop variety	35.4	20.5	
Planting date	6.1	3.4	
Plant population	4.3	3.9	
Tillage and moisture conservation	4.9	13.2	
Crop protection	5.5	7.8	
Soil fertility	32.3	38.5	
Other cultural practices and crop comparisons[1]	11.6	12.7	

[1]rotation, intercropping, regenerative agriculture, castor, bambaranut etc

Table 5. Ratio of crop variety to other technical areas (based on Table 4): 1987/88 and 1989/90

	1987/88	1989/90
Planting: Crop variety	0.17	0.17
Population: Crop variety	0.12	0.17
Moisture conservation: Crop Variety	0.14	0.64
Crop protection: Crop variety	0.16	0.38
Soil fertility: Crop Variety	0.91	1.88
Other practices: Crop Variety	0.33	0.62

Discussion on paper

Rapporteur: O.T. Mandiringana
Discussants: P. Johnson and A. Pilime

1 The focus of research is changing in the right direction. It has been illustrated that the proportion of projects on moisture conservation and soil fertility improvement increased between 1987/88 and 89/90 (Table 4). The increased focus on these two areas is appropriate for the semi-arid communal areas which are located on overused and infertile sandy soils.

On soil fertility issues, the re-emphasis on manure use is appropriate but there were some errors of focus in the past in that manure value was looked at in chemical terms only when its prime impact is in the buffering of light textured soils against leaching through chelation-type processes, as well as changes in pH and nutrient levels. The fact that manure from communal areas consists of as much as 85 percent sand and that veld improvement has a positive impact on manure quality revives the need for compost making research. Where will the herbage come from etc?

2 Pedologists and Land Use Planners should be more involved in the design of trials on soil fertility and soil moisture conservation, since soil fertility scientists cannot be expected to adequately mirror the soil/land factors and their full environmental impact. To achieve this, pedologists and land use planners should be involved in the following:

a) Prioritization of trials
b) Design of vlei utilization research
c) Synthesis of available information on communal area agricultural production in different agro-ecological areas, in order to avoid narrow product-specific projects and encourage production-system-focused-work
d) Providing a link between on-farm trials and the farming systems research orientation, via land use plans.

3 Comments on specific quotes from the paper.

a) 'COFRE should facilitate the sharing of results of trials and demonstrations through interactions and the creation of a data bank on projects'. In AGRITEX, there has always been a difficulty in getting both trial and demonstration results from provinces and research stations. This seems to be a problem with both departments and should be redressed as a matter of urgency.
b) 'However, the number of livestock projects, especially from DR & SS, has been disappointingly small'. This is true when it is known that 93 per cent of communal areas are in Natural Regions III, IV and V, where livestock is very important.
c) 'COFRE, commodity subcommittees have synthesized available research information into tentative technical recommendations for the production of several field crops in different agro-ecological regions of the country'. AGRITEX (Crop Production Branch) have issued some 1,600 handbooks on 'Recommendations for cropping in the semi-arid areas of Zimbabwe' It will be remembered that DR & SS and AGRITEX contributed to this handbook via the workshop on 'Cropping in the semi-arid areas of Zimbabwe' 24th-28th August 1987. In this handbook, it was pointed out that the recommendations should not be regarded as a blueprint but as a set of tools with which field officers might deduce recommendations for specific needs.
d) 'Late input deliveries from AGRITEX Head Office'. This excuse is no longer valid since all provinces were given a sub-vote allocation for purchasing inputs for on-farm trials in August 1989.
e) 'DR & SS should consider designing part of its on-station research programme with a farmer problem focus and then invite groups of selected farmers to visit such trials'. This approach was suggested in a paper given to a DR & SS gathering in September 1989. The method can be successful.

General discussion

1 Current on-farm projects have placed little emphasis on socio-economic issues. It was pointed out that some projects are abandoned as irrelevant because, from the beginning, little consideration is given to the farmers' situation.

2 On-farm projects should be subject to impact assessment both before and after implementation. It was also pointed out that, although most projects aim to improve productivity at the farm level, COFRE needs to institute a mechanism of assessing the extent to which resultant technologies are actually adopted by farmers.

3 Considerable concern was expressed on the fact that very few livestock projects were being conducted on farmers' fields. It was however pointed out that this was not only a function of transport and financial constraints but also a result of the difficult nature of such projects; for example, the non-availability of fodder, the presence of communal grazing systems, the difficulty of compensating farmers for death of livestock etc. However, some relevant work is being done on the efficient utilization of both locally produced and purchased livestock feeds at Matopos, Makoholi and Grasslands research stations.

COFRE LINKAGES WITH THE GRASSROOTS AND THE INFLUENCE OF ROFREC ON ITS ACTIVITIES

P. Nyati,
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Introduction

The National Research and Extension Services have responded to the call by the government for increased agricultural productivity in communal areas by, among other things, focusing on strategies that improve and strengthen technology generation and the dissemination process (Fenner and Shumba 1989). The Committee for On-Farm Research and Extension (COFRE) was instituted for this purpose. Its current scope encompasses problem identification, planning on-farm trials and demonstrations, project prioritisation as well as the monitoring and evaluation of trials and demonstrations implemented on farmers' fields. While prioritising those trials and demonstrations to be implemented, COFRE has no perceived upper limit on the number of projects because its activities are divorced from financial resource constraints, a fact that sometimes makes COFRE decisions a financial burden on implementing DR & SS stations and AGRITEX provinces. Thus, the lower or upper limit of COFRE activities should be defined in the context of an available level of finance given to COFRE for its use.

Constraints and possible solutions

To date, COFRE does not have a budget despite its existence for the last four years. This has led to a weakening of ROFREC (the Regional On-Farm Research and Extension Committee). To make the linkages effective at the 'grassroots' level, the executing officers need both material and financial support from both Departments. Furthermore, the decentralisation of input acquisition is necessary to help the timely implementation of on-farm projects.

Extension and research are housed in separate departments with a general tendency towards the separation of interests between the two services (Hakutangwi, 1989). This observation emphasizes the need for strengthening COFRE linkages in order to overcome this separation. COFRE as an amalgamating body between research and extension (up to the extension worker level) is a sufficiently robust inter-disciplinary organ capable of tackling the immediate problems of communal area farmers.

However, more training is required in on-farm research and extension methods. For example, although extension workers are a major source of information about farming circumstances at the grassroot level, they need to be exposed to diagnostic survey and/or rapid rural appraisal methods for them to focus more closely on farming system problems and not exclusively on commodity specific constraints. Although their superiors, i.e. the Agricultural Extension Officers (AEO), are the obvious candidates for such courses, it is questionable whether the knowledge gained is transmitted to their subordinates. This aspect needs redressing. Sessions have to be devoted to elementary biometry, experimental designs, diagnostic survey techniques etc. so as to equip officers with practical application methodology and thereby raise their confidence in trial and demonstration layout, data collection, monitoring and, in the long term, evaluation of their own work.

Furthermore, ROFREC cannot be effective in formulating trials (and, to a lesser extent, demonstrations) if extension personnel do not fully appreciate statistical language. As much as there are valid arguments for the socio-economic analysis of the farmers' circumstances, it is also important to subject project results to valid statistical and economic analysis. To this end, AEOs in AGRITEX should receive basic training on the statistical and economic analysis of on-farm projects.

ROFREC has so far had a significant input in the formulation of trials and demonstrations (Fenner and Shumba, 1989). Research results are now easily communicated to regions for inclusion in demonstration projects, adaptive research trials and/or verification trials through the recommendations of commodity sub-committees. The existence of ROFREC enables AGRITEX personnel with local experience to influence the selection of problem

areas addressed in DR & SS on-farm trials, and allows DR & SS to influence the technical content of demonstrations conducted by AGRITEX. Thus ROFREC ensures that individual institutes and stations do not approach AGRITEX for trial sites independently (a legacy of the past). However, to effectively strengthen linkages between COFRE and the farmers, commodity sub-committee conveners who are specialists in that field must be invited to address farmers on specific topics during field days. In their absence, a DR & SS representative should be co-opted. Farmers have to be told why field trials and demonstrations are being carried out so that they contribute to the design and evaluation of such projects.

For ROFREC to be effective in influencing COFRE, the ROFREC chairperson should sit on some of the commodity sub-committees relevant to their discipline. This would help the ROFREC chairperson understand how some ROFREC submissions to COFRE are improved by a pool of specialists in particular subjects. In turn, the ROFREC chairperson by attending commodity sub-committees might help support ROFREC trial and demonstration submissions. Sometimes trials and demonstrations are eliminated at the commodity sub-committee level because of lack of clarity in problem presentation; yet the problem itself might be an important one although poorly explained on paper.

Also, some projects that are recommended for termination or are rejected by sub-committees still continue. This would not happen if the commodity sub-committee chairman wrote minutes that clearly indicated (1) the trials and demonstrations that were approved and had to be implemented as presented, (2) the trials and demonstrations that were approved but were to be implemented only after certain suggested modifications were incorporated, (3) those that were not approved and were to be terminated or discontinued, (4) those that needed a total re-submission the following year.

A lower and upper limit on the number of projects each province and station can handle should be determined by ROFREC after the national COFRE has indicated the budget allocation; otherwise planning for COFRE trials and demonstrations will remain unrealistic. Furthermore, most trials and demonstration projects from ROFREC should be submitted to COFRE with a costing of the materials needed and the mileage costs since the locations of both the executors of trials or demonstrations and the trial sites are known. Such a costing will improve linkages with the national COFRE because the commodity sub-committee chairmen will be able to sum up the total costs for projects approved for implementation when submiting them to the national COFRE chairman for final approval and budget allocation, through a Liason Office.

Lack of an effective linkage between research and extension easily leads to conflicting conceptions by staff and opposing instructions to farmers (Hakutangwi, 1989). To strengthen links, a possible COFRE function organogram is suggested in Fig.1.

Commercial farmers have a role to play in technology generation. The two Departments should respond favourably to the needs of these farmers also. They have several organizations (Cattle Producers Association, Dairy Producers Association, Goat, Sheep Associations, Grassland Society of Zimbabwe etc), all of which require our participation in their field days, meetings seminars and symposia. It is through a Liaison Office that these linkages can be kept active. There are certainly other ways of linking up with the commercial farming sector, through membership of societies, station or institute level contacts, and through AGRITEX and the Dairy Services of DR & SS.

Conclusion and Summary

For COFRE to meet grassroot aspirations, a neatly woven mechanism of linkages devoid of bureaucratic hindrance should be developed and continually reviewed for timely changes to be made to respond to the demand of socio-economic change. The circumstances of the farmers are not static and our recognition of this means that COFRE through ROFREC should continue to monitor and evaluate that change through an intensified interaction with the farming community. Diagnostic surveys to examine the strengths and weaknesses of the current farming systems need material and financial support through the co-ordinated efforts of both

Departments. The confidence of field personnel needs a boost through appropriate training to equip them with the techniques necessary to perform their work.

If ROFREC is to have an effective link with the national COFRE, this should be achieved through well planned and costed trials and demonstrations supported by adequate documendation so the main COFRE can better understand. The most important feature of the given COFRE function organogram is the Liason Office that is intended to reduce the workload of the COFRE chairperson who normally has other pressing responsibilities to attend to.

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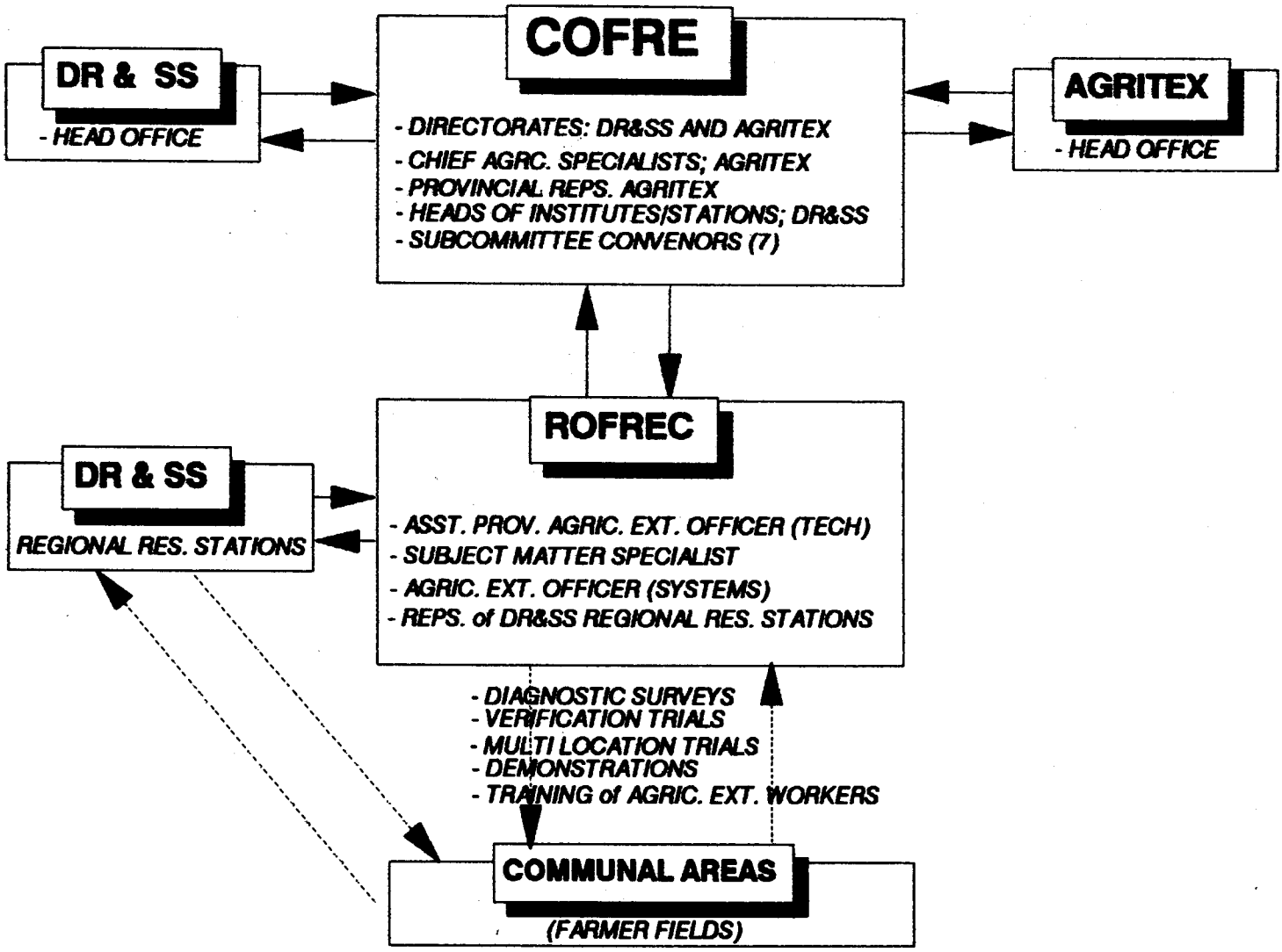

Figure 1. Committee for On-Farm Research and Extension (COFRE)

Discussion on paper

Rapporteur: L.T. Gono
Discussant: D. Kumar

1. The author writes that COFRE was instituted for purposes of strengthening research and extension linkages. In my view, this should be stated as: 'COFRE was instituted for the purposes of strengthening on-farm research and research and extension linkages'. This may be true, but a lot of roles, activities and functions are not very well understood and confusion often leads to suboptimal results and even abandoning some of the desirable attributes. It may be useful to mention some of these as follows:

   a) The nature of on-farm research which COFRE is supposed to look after. Should it be basic, supportive, applied, adaptive or demonstration?
   b) The function of ROFREC is not very clear.
   c) How these two bodies (COFRE and ROFREC) are supposed to link with each other is not adequately explained.
   d) How is a researcher supposed to link with the extension personnel and at which level?
   e) The two-way flow of information, i.e. from the farmer to the researcher and from the researcher to the farmer, is not clear.
   f) How does COFRE relate to the Farming Systems Research Unit?

2. The author proposes a COFRE budget. It is not clear how this budget should be handled. COFRE, in my opinion, should have an office with a financial allocation to run the activities of the office of COFRE and not to run the trials and demonstrations themselves. This should come from the respective votes of the Institutes and Provincial Offices of DR & SS and AGRITEX.

3. Some very relevant points have been given by the author. For example, costing should be included in all the Project Proposals coming to COFRE or Sub-committees. It is also true to say that strong linkages should exist between researchers, extension personnel as well as the farmers.

4 The author suggests that extension personnel should understand statistical language. In my view, they should have knowledge of all the agronomic aspects of crop management, soil and water conservation and, in general, should be able to appreciate the objectives of the trials and demonstrations.

5 Finally, the author has proposed linking up farmers through membership of societies, stations and institutes. This aspect is absolutely not clear. This, as he has also mentioned, could be possible through participation in open days, field days or some could be invited to speak when we organize a seminar on topics related to their interests or we could speak to them on similar occassions.

6 The paper has tried to give an overview of linkages, but I expected a full appreciation of the existing linkages and suggestions on how they can be improved. ROFREC as a body has not been very active and this paper should have suggested a model for various ROFREC activities. Certainly one would have liked to see more references and activities quoted from other parts of the world.

General discussion

1 Strengthening COFRE

There was considerable discussion on the merits and demerits of institutionalizing COFRE within DR & SS and AGRITEX. The following resolutions were made:

a) The Laison Office in AGRITEX and the Information Services in DR & SS should be actively

involved in the day to day activities of COFRE in order to relieve the workload on the chairman.

b) For effective monitoring and administration of COFRE activities, the committee should be allocated a budget by both departments. The directors of the two departments endorsed this recommendation.

c) COFRE activities should be taken as part of, and not as an additional workload to, staff in both departments. This implies changes in attitudes by some members of staff.

d) The chairmanship of COFRE should be extended from one to two years to ensure continuity. The strong involvement of the AGRITEX liason office and DR & SS information services would reinforce this by reducing the day-to-day workload of the chair.

2 The Subject Matter Specialist (SMS) as a point of linkage

It was agreed that the point of linkage between DR & SS and AGRITEX had not been well defined in the past resulting in the present weak linkage between COFRE and ROFREC. It was resolved that the linkage should be restricted to the research officers in DR & SS and SMSs in AGRITEX. Depending on the need, these two categories of staff can jointly approach AGRITEX field staff on issues like site selection, project implementation etc. The current situation where researchers directly approach field extension workers has tended to overburden the later. This new approach would ensure that the researcher and SMS would jointly design and implement relevant training courses for extension personnel where necessary. Such an arrangement would enable the Agricultural Extension Officer (systems) and local extension workers to perform their current everyday tasks as well as COFRE activities.

3 Other ways to improve DR & SS and AGRITEX linkages

AGRITEX indicated that it would like to see DR & SS participate at the Harare Agricultural Show alongside them because this would provide a learning opportunity for researchers and also familiarize them with other AGRITEX functions.

It was also pointed out that AGRITEX is currently in the process of diversifying its activities to include areas like home economics and youth extension. AGRITEX would like DR & SS to participate with it in such ventures.

ARE THE TECHNICAL ISSUES BEING ADDRESSED IN ON-FARM RESEARCH AND DEMONSTRATION PROJECTS RELEVANT TO FARM LEVEL PROBLEMS, OR HAVE WE MISSED THE BOAT? AN EXTENSION OFFICIAL'S PERSPECTIVE.

P.H. Johnson
Chief of Crop Production, AGRITEX

Introduction

I first touch on technology for inclusion in on-farm research and extension. The Workshop on Cropping in the Semi-arid Areas (1987) put forward many suggestions for relevant research. Many of these issues still remain unsolved. Indeed, it was only in 1986 that the Department of Research and Specialist Services (DR & SS) adopted the practice of inserting treatment levels into their fertilizer experiments that range from zero to the point of inflection on the response function curve. Also, at that time, labour inputs were suggested to be recorded for each trial treatment.

I am confident that the DR & SS has not addressed all the technical issues since the Crop Production Branch of AGRITEX has not received information from DR & SS to suggest the contrary.

'On-farm trials' or 'on-farm research'

What form should on-farm research take if it has farmer participation in technology development as its objective?

At this point, we must make a distinction between on-farm research and on-farm trials. The basis of a trial, whether it takes place on-farm or on a research station, is to compare two or more options. It is obvious that the alternative technologies must, therefore, be in a relatively well defined state. Since the thrust of our argument is that farmers must be incorporated into the process of development and that the purpose of on-farm research is to provide farmers (and researchers) with an appreciation of the options presented by the technology, it should be clear that on-farm trials as they are most commonly structured in Zimbabwe will be of little value.

The fact that on-farm research might exclude conventional on-farm trials, whose principal objective is the validation of packaged tehnology, does not mean that there is no need for evaluation in the research process. Indeed, another important distinction between standard on-farm trials and on-farm research that aims at technology development is the kind of outcome variables that are of interest for evaluation. It is probably fair to say that the central outcome variable in most on-farm trials is crop yields. Other variables may include such things as labour inputs, crop quality and farmer satisfaction. However, since the purpose of on-farm research is to develop an appreciation and understanding of technology performance and develop options rather than pick a winner, the question of appropriate outcome is of great interest to the farmer. This can be assessed via questions such as: Is the technology being used in the second year? Is the area with the new technology being enlarged? Are neighbouring farmers adopting? Are the farmers developing new ways of using the technique?

On whatever basis the farmers are making these decisions on adoption and modification, one can be reasonably well assured that it involves a level of analysis and synthesis which goes far beyond even the best formal experiments designed to 'provide a valid assessment under farmer conditions' (Farrington and Martin, 1987). The need is *not* to keep the trials 'simple enough for farmers to understand and evaluate' (ibid) nor to develop more sophisticated statistical methods, but rather for research and research institutions to accept the proposition that *adoption by farmers is validation of a technology*, even if we are unable to always identify or quantify the technology's effects.'

We do not want on-farm trials which in reality are an extension of some research station. This type of work is of little use to anyone except perhaps the person who is doing research for a promotion. Even then, there must be

some doubt in the mind of the supervisor as to the value of such work.

Some persons may argue that the role of on-farm research is to validate research results. If research is carried out correctly and, furthermore, if it satisfies the four basic subsystems of agriculture, there should be little or no need for this. In any case, on-farm research should consist of giving factor 'X' (the improved variety or innovation) to the selected farmer in small quantities i.e. 1 or 2 kg of maize seed. The farmer will be able to tell you if he wants to use more of factor 'X' or not. There is no need to measure the crop if our client or customer is satisfied. I don't think we want to play 'GOD' to evaluate, if it is suitable for him.

On the question of relevance

Who makes the on-farm research relevant?

I believe that the extension department has an important role to feed back problems to research, see Figure 1. This shows very clearly the steps to be taken in on-farm research. However, along the way, there are several tests to be taken before 'factor-X' can be said to be relevant to the smallholder farmer. Do we know what these are, their relative importance and how they are carried out?

To do this, we need a 'five sieve test'. This is composed of five parts: biological; production economics; risk; work and ergonomics; and social-economics. The basic question that must be addressed is: Does factor 'X' pass through all the five mentioned sieves? Is factor 'X' acceptable to the farmer when viewed from each of the above aspects? The relative importance of each sieve will depend on commodity, farmer objectives, uses for output, rainfall regime etc.

Biological

Let us consider the biological sub-system of agriculture. On- station trials are carried out to determine which factor is determinant for certain outcomes or commodity characteristics. Frequently in use is the statistical term 'significance', obtained through using finely tuned biometric tools. The question here which research must ask itself is: If the farmer will only adopt an innovation when the return on capital is between 50 percent and 100 percent (which is equivalent to a '2 to 1' return of which farmers often speak) (CIMMYT, 1988), is there any advantage in using the scalpel of biometrics rather than the axe of practicality? The point here is that it would seem likely that working on a rate of return of 50 percent to 100 percent, both the farmer and the researcher would probably be able to see if the response to factor 'X' is acceptable or not. If this procedure is adopted, then research could streamline its approach with a saving in both time and money. Assuming the returns from factor 'X' are satisfactory, we move on to the production economics.

Production Economics

The production economics seive test is mainly satisfied by consideration of the CIMMYT Manual 'From Agronomic Data to Farmer Recommendations' (CIMMYT, 1988). Connected with this topic, although rare in discussions, is the subject of risk.

Risk

The following step by step procedure is a crude method of assessing 'climatic risk' to be used with an economic evaluation of research results from research stations for extension purposes:

a) Use only those results from trials which have a coefficient of variation of 25 percent or less.

b) Carry out an economic analysis as detailed in CIMMYT Economics Training Manual (CIMMYT, 1988).

c) Use the publication: 'Agroclimatological analysis of growing season in natural regions III, IV and V of Zimbabwe' (Hussein, 1987). This publication contains, for selected meteorological stations, frequency distributions for the start, end, and length of the growing season. Determine the nearest station to which you can apply the data. If a research station is in natural region I or III, calculate the start, end and length of the growing season as described in the publication.

d) Determine the length of the growing season for the year of the trial.

e) Carry out a significance test in the normal way using, 'Length of growing season' — 'mean' standard deviation

f) Your results from (5) should give you a measure of reliability which can be used for extension purposes. Any number over two standard deviations should be used with caution, particularly the negative, which has little application. As an example: a marginal net benefit of 'X$' was obtained using a factor 'Y'. This result is estimated to have an occurrence of not less than 25 out of 30 years, which involves a low risk.

It would be useful at this stage to give an example of risk aversion. Let us consider growing maize in natural region V. Why do farmers grow maize in this region, when agroclimatic conditions appear to be more suited to sorghum and millet?

The areas of grain crops grown in N.R.V are shown below:

Area in hectares ('000)

Year	mhunga	maize	sorghum
1986	82	90	149
1987	53	109	113
1988	83	78	141
1989	71	101	139
Average	72	94	135

Aproximate ratio 5:7:10

Let us look at some of the reasons why farmers grow maize in this region:

a) Farmers like maize as a food.

b) If maize is a failure, drought relief is given with maize!

c) Sorghum is attacked by birds; maize is not.

d) At Makoholi Research Station, sorghum has never out-yielded maize.

e) Research in Chivi communal area showed that the ratio of the area planted to maize versus millet varied in relation to the previous season's rainfall as shown below:

	(Proportions as % of total area planted)				
	1974/75	1981/82	1984/85	1985/86	1986/87
Maize	42,3	41,4	30,0	59,3	7,4
Small Grains cereals	33,2	24,1	35,0	19,2	42,6
Annual rainfall of previous year (mm)	850,2	683,1	397,7	823,7	378,7
Annual rainfall of previous year over (+) or under (-) average of 559mm	+	+	–	+	–

f) Millet and sorghum require approximately twice as much work to produce and process as maize.

Let us now look at the *strategy* the farmer is using:

(i) Planting times. Staggered as in the case of Chivi communal area.
(ii) Assessment of risk aversion using Chivi communal area as an example:

The probability of a growing season of 120 days or more in the area is 0.27. The probability of getting at least one season of this length or more in three successive seasons is:
$(1 - [0.73]^3) = 0.61$

This is also the probability of getting a 120 day growing season length in natural region II (high rainfall areas) in any one year. From this, one could conclude that a one year frequency of a good season in natural region II is equivalent to three years in natural region V.

Thus, for planning purposes for maize, it is helpful to think of natural region V as having a cycle of three years rather than the customary one. The consequences of this are that:

a) The maize variety grown should be able to store for 3 years.
b) Consideration has to be given to underground storage of harvested grain.
c) There should be a sliding scale of prices to encourage the local storage of harvested grain.
d) Natural grain storage pesticides should be developed.

Based on the foregoing, it can be concluded that farmers grow maize in natural region V for a variety of reasons but also show rational judgement in the assessment of risk aversion. For example, the area planted to maize will tend to vary with the previous season's rainfall.

Work and Ergonomics

The most important question in the work and ergonomics sieve is: If factor 'X' is adopted, will it increase work at peak periods in the year? Another consideration is the question, Will the innovation make work harder? Estimation of gross margin per labour hour is important to consider if R-values are relatively low. Let us consider the table below:

Crop	Yield	G.M./ha*	Labour hrs/ha	G.M./Lab hour
Flue-cured tobacco	1500kg/ha	$3649	2194	$1,663
Maize	4000kg/ha	$454+	285	$1,593

*Average return = $6401/ha - Personal communication
Cost of production = $2752/ha - J. Chisweto-Z.T.A.
+$454 - figure from Farm Management Branch of AGRITEX

From the table, the return per unit land area is high for flue-cured tobacco compared with maize and would be acceptable if R-values were high.

Socio-economics

The last sieve to use is that of socio-economics. In some ways, this aspect is difficult to interpret since, although perhaps vague, it covers a wide field. This includes aspects such as access roads to proximity of schools and markets.

It must be pointed out that, if taken singly, all the above sieves may not be important, but that if all are considered jointly, they have far reaching effects on the farm and farming and, by consequence, how readily the farmer will adopt new agricultural practices.

Conclusion

Consideration has been given to the definition of the term 'on-farm research'. It is suggested that adoption by farmers is validation of a technology and frequently the technology is thereby changed for the better. It is, therefore, argued that the measurement of changes in yield become unnecessary in on-farm research since that has already been done on the research station. To this end, a set of screening processes has been proposed before any new innovation is given to the farmer.

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Discussion on paper

Rapporteur: L.T. Gono
Discussants: Z.A. Chiteka and N.R. Gata

1 The paper has discussed some aspects that have to be considered when conducting on-farm research. For example, the identification of problem areas, setting priorities, assessing the economic benefit and risk analysis. However, the implications in the title of the paper were not fully covered. There was an absence of the technical issues that should be addressed by COFRE. Technical issues here mean items such as, planting dates, plant populations, appropriateness of COFRE fertilizer recommendations and the choice of crops for different agro-ecological zones. The paper should have dwelt at length on these aspects and indicated whether COFRE should re-direct efforts to better answer the technical issues faced by the farmer. The strong points, successes and failures of COFRE should have been clearly outlined and some concrete suggestions made.

2 The purpose of on-farm research, quote 'to provide farmers and researchers with an appreciation of the options presented' is imprecise. It does not encompass the various forms that on farm research may need to take. For example, on-farm trials may be done to test a technology developed at a research station under real farm situations, or it may in itself be part of the research and development process.

3 Quote 'We do not want on-farm trials which are in reality an extension of some research station'. There are some trials which are basically intended to verify the effectiveness of a technology under real farm situations. Of necessity, therefore, such trials have to be conducted following certain principles of experimentation similar to what would be done at a research station. Examples of such trials would be those involving fertilizer levels, tillage and innoculation.

4 We agree with the author's five seive test. However, we feel that it be adapted to local situations. Impact assessment should be viewed as a continous exercise occuring before, during and after project implementation. This should be done within the context of the biological, physical and socioeconomic environments in which the technical intervention is introduced.

5 Risk is an unavoidable fact that farmers and, for that matter, any business has to work with. Production technologies may be developed which minimise those variables that worsen the risks that a farmer has to take.

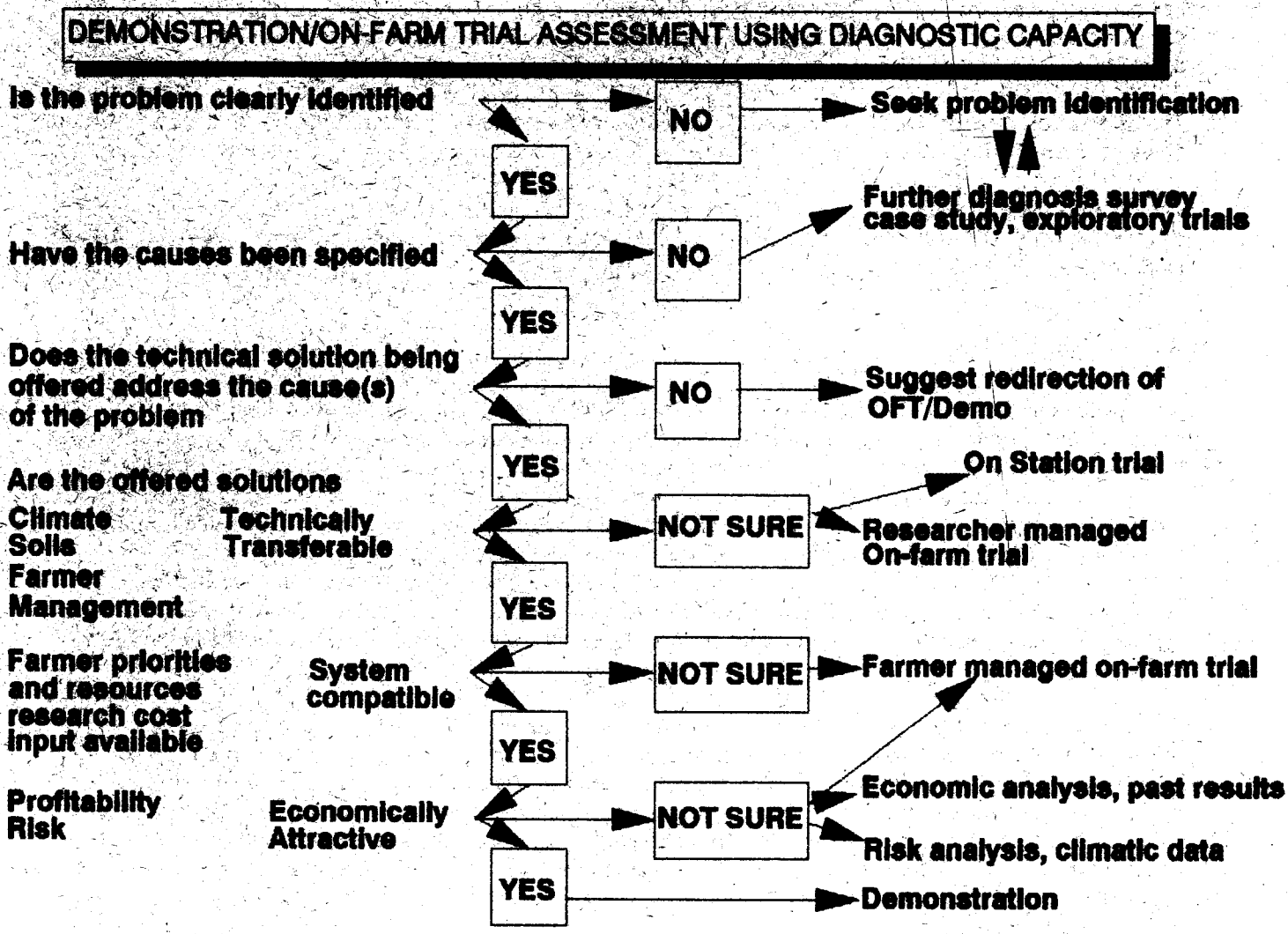
General discussion

1 It was felt that some of the technologies became irrelevant to farmers because of the lack of important linkages to ensure their effective implementation. For example, moisture conservation techniques researched by several institutes or stations could not be implemented by farmers due to lack of appropriate ox-drawn equipment to make and tie the ridges. It was suggested that the Institute of Agricultural Engineering should inventory all the equipment they have produced to date and distribute the list to the relevant individuals through COFRE.

2 It was pointed out that observations indicating the farmers' preference of maize to small grain cereals (better adapted to marginal rainfall areas) is interesting and requires further probing on why this is so. A simple questionnaire to farmers to obtain information on socio-economic circumstances influencing farmer decisions on the choice of crop or crop variety was suggested.

3 Susceptibility to nematodes was mentioned as one of the reasons why small grain cereals were outyielded by maize at locations like Makoholi. It was however pointed out that such comparisons were unfair since varieties in small grains were being compared with hybrids in maize.

4 A participant pointed out that, given our limited resources, there was a need to prioritize and to keep the research agenda farmer problem specific by consulting farmers early in the research process. While we appreciate that the farmer knows his environment well, it is still necessary to blend this knowledge with our technical knowhow in developing improved technologies.



(Source: CIMMYT)

Figure 1. An example of screening for relevant recommendations

BUDGETARY CONSTRAINTS AND THEIR IMPACT ON ON-FARM PROJECTS: DO WE HAVE ANY OPTIONS?

R.J. Fenner
Director, DR & SS

For me, the preparation of this paper has been difficult! It is not the subject itself, but having to make the decision on its length. The constraints placed on on-farm projects in Zimbabwe are well known and have been debated for several years. The options to overcome the constraints are limited.

The first part of my paper covers the subject by reviewing its basic questions: Why? Where? and with What? By doing so, I believe it is the most certain way of bringing you all face to face with the realities of our plight!

The second part will, I hope, engender discussion to ensure we continue to serve the farming community as a whole. I am here to distil a mixture of thoughts into their component fractions, ending up with a constant boiling mixture for use by both DR & SS and AGRITEX.

Why and Where

Our present research and extension thrust is unarguable. We must stimulate smallholder food production and access to food, particularly in the areas of food insecurity. But remember that, to give useful advice to farmers, it is important to have a working understanding of the circumstances in which the farmer is making the decision. On the other hand, the basis for the advice given comes from the researcher who has the ability to identify the problems of production, suggest and test suitable and applicable interventions whether the problems are of a technical origin, reflecting shortcomings in agro-ecological environments, or are management compromises because of competing needs. Nevertheless, the identification of compromises is the key to the development of appropriate solutions and to do this the researcher must have a good understanding of the complete farming system. He must realize that the tendency in a farming system is to form wholes that are more than the sum of the parts.

But we cannot do it all! Consequently, priorities must be set, and there are many mathematical approaches to this problem. Some of you may have tried to develop an algebraic formula to assess research benefits or applied the partial equillibrium trade model for agricultural research evaluation. I have not and I wonder if either are appropriate to the level of sophistication we have attained. I believe that the more subjective approaches have stood, and still do stand, us in good stead. We basically use criteria which allude to equity or distribution concerns such as: (a) nutritional status, (b) the contribution of different commodities to the improvement of per capita incomes, (c) the extent of food insecurity or, the one that seems to take precedence of late, (d) commodity contribution to exports.

The question to ask now is whether we have come up with a list of priority activities for smallholder agriculture? I think we have, and here I will mention a few.

(1) The role of regenerative production systems that include green manuring and the use of crop rotations designed to increase fertility must continue to be examined. (2) Proper advice must be available on realistic yield targets, with (3) the concomitant cost effective plant populations and fertilizer applications and biological control of important pests. (4) The breeders should continue breeding for disease and drought resistance.

Such a suite of research objectives calls for researchers to work closely with extension staff and to consult with the smallholder farmers. This can only be accomplished through on-farm trials and demonstrations. But with what?

With What?

During the early 1980s, the Department of Research and Specialist Services substantially expanded its research efforts to a point where almost every institute and station had a significant on-farm research programme. By 1986, nearly 20 percent of the total research effort, as measured by researcher person years and 50 percent of the total recurrent expenditure was devoted to on-farm activities. But the honeymoon is over!

In 1980, just under 13 percent of the total budget of our Ministry was allocated to this Department, but now it is less than five percent. For several years, the research responsibilities of the Department somehow expanded as the financial resources contracted. In consequence, the proportion of our total budget devoted to salaries has increased from 50 percent to just over 70 percent during the same period. This obviously has adversely affected the availability of operating funds and our productivity. We are unlikely to have bottomed out! In 1989/90, the Government increased its contribution to DR & SS by 14 percent but, with inflation running at an average of 15 percent and CMED increasing their charges by 62 percent money has been very tight this year. For 1990/91, the government have promised a mere 6.3 percent and, with trade liberalization, inflation is likely to be 30 percent. Obviously we cannot win.

On-farm trials are very expensive and thus they are the first to go. What are the alternatives? Can we supplement our recurrent budget?

a) Increased contributions from the private sector? This is unlikely. The National Farmers Association of Zimbabwe cannot levy their members and, consequently, their support can only remain verbal.

   The Zimbabwe National Farmers Union is small. Their income is small but they do contribute, not on an increasing scale. They give us what they consider to be what they can afford.

   The Commercial Farmers Union, on the other hand, have for many years been the main private contributor to DR & SS funds. In fact, on average, their contribution is 10 percent of our recurrent expenditure. But like all such giants over the years, their contribution has declined in real terms. This is probably partly due to the establishment of private-sector agricultural research organizations since 1980; in particular, the Agricultural Research Trust.

   I believe the only way we can hope for increased support is to show the commercial sector that synergistic interactions in research are mutually beneficial. We must sell ourselves.

b) All DR & SS produce and service sales to be placed in the Agricultural Research Fund?

   Regrettably, the Ministry of Finance, Economic Planning and Development (MFEPD) consider DR & SS to be a source of revenue and thus they expect all proceeds to go directly into the Exchequer Account. However, last year's revenue would have barely covered our recurrent expenditure of Z$4.7 million. Consequently, I would be careful with this suggestion. As costs rise, would we not try to become more and more commercially minded with the resultant increased effort in production rather than research? Nevertheless, if we were allowed to keep our revenue to top up the government's contribution that would be another matter. I hope to approach our Minister on this issue.

c) Reduce costs by mimicking on-farm trials on the station? Can this be done?

   I consider the design of farming systems research to have two distinct phases: (1) the design of improved cropping patterns to be tested, which demands clean statements about the management alternative, and (2) formulation of the overall research programme to be conducted at a particular site or locality. This is exactly the same procedure that should be done for all research programmes whether on- or off-station.

However, farming systems research sites or localities are usually selected to represent land types or production environments that occur within *extensive* target areas. A cluster may, therefore, cover a continous area, or comprise several small selected areas. It is difficult and impracticable if field days are an important part of the extension agenda. Nevertheless, I believe in the short and medium term we have no option, and certain stations already have such programmes. The Lowveld Research Stations have a water-harvesting programme on station to which many visitors come, the Agronomy Institute have the farming systems demonstration on Makoholi, and ICRISAT have a trial to measure the effect of till, stubble, nitrogen and weed control on the yield of sorghum. All three, and I could mention a few more, are not formal, complicated trials looking for third order interactions. They are replicated, of course, but they are simple in design and farmers can easily see the differences in treatments.

In summary, finances will not in the foreseeable future match inflation. Consequently, expensive on-farm trials must be drastically reduced, and an attempt to mimic such trials on-station must be made. However, I cannot over-emphasize that any such change of policy must still need the backing of on-farm research. Priority setting becomes an even more important aspect of management than ever before.

Discussion on paper

Rapporteur: L.T. Gono
Discussant: S. Pazvakavambwa

1. The downward trend in funds allocated to agricultural research by the central government implies that research activities have to be prioritized in relation to the resources available. This can only be accomplished if researchers understand the circumstances under which farmers operate. A good basis from which to lobby for funds from the central govenment would be to demonstrate the impact of research in a particular area through case studies.

2. While it is agreed that the decline in budgetary provision for research has negative effects, financial considerations should not be the sole criterion for winding up on-farm trials.

3. The fact that the Commercial Farmers Union (CFU) has fully supported the Agricultural Research Trust Farm (ART) shows that they are aware of the importance of research. A possible option would be to make DR & SS a parastatal. This would enable researchers to be fully accountable to their clientele as is the case with ART farm and commercial agriculture.

4. The National Farmers Association of Zimbabwe (NFAZ) could fund DR & SS if it is made aware of the importance of research. However, because NFAZ cannot levy its members, whatever contribution it might make will remain modest. On the other hand, the Zimbabwe National Farmers Union (ZNFU), which levies its members, could be a significant source of funding for the department. The ZNFU has not done much in this respect, possibly because research and extension activities have not been vigorously directed towards the small scale commercial sector.

5. Given the department's budgetary constraints, it could try to mimic on-farm trials at stations along similar lines as at the Cotton Training Centre in Kadoma.

6. The government may not be fully supporting research because DR & SS is not vigorously projecting a possitive image. There are numerous ways through which the department could 'sell', itself but these remain unexplored.

General discussion

1. Publicity.

   It was agreed that DR & SS had not done enough to publicise and 'sell' itself in order to lobby for financial support from policy makers. Suggestions ranged from the need to produce reports showing the economic implications of the department's work to inviting policy makers to DR & SS field days.

2. Audience with parliament

   The meeting suggested that the DR & SS directorate should go to parliament and explain its financial predicament, indicating what research will have to be stopped and the cost of such moves, if more funds are not forthcoming.

3. Medium term budget forecasts

   Given that the department's financial allocation does not usually last until the end of the financial year, a participant wondered whether it was not possible for DR & SS to be allowed to operate on a medium term (e.g. three year) budget system. However, it was pointed out that, although such an arrangement would be ideal, the government unfortunately budgets on a yearly basis. Some measure of flexibility only existed in the use of donations from farmers' associations.

4. Other forms of publicity

   a) Publicising the department's results is not easy to quantify. Maybe we could ask people who use our recommendations to include an acknowledgement of DR & SS. For example, on seed packets, one could write that the particular variety was released by DR & SS and this could also be included in the advertisement.
   b) DR & SS could also adopt a policy of asking all its stations to concentrate on solving problems in communal areas located nearest to them (to cut on transport costs). Once we get an impact in such small areas, we could use the success to argue that, if we had had more money, this could have been accomplished in more areas.

THE ROLE OF DEMONSTRATIONS WITHIN AGRITEX. IS THE CURRENT POLICY OF ONE DEMONSTRATION PROJECT PER EXTENSION OFFICER THE IDEAL?

G. Tsododo
Assistant Director (Field) AGRITEX

Introduction

In this paper, the term 'demonstration' is defined as putting across an acceptable, simple, and single agricultural message on the ground. Demonstrations are more effective if they carry a single message at a time since most of our farmers are illiterate. For example, Gumunyu (1984) noted that, although most of the agricultural tasks in communal areas are performed by women, about 50 per cent of the women in Guruve communal area had not received any formal education.

On whether AGRITEX should insist on one demonstration project per extension officer or specialist, the answer is both yes and no, depending on the objective of the demonstration.

Objectives of demonstrations

Generally speaking, demonstrations are carried out for three purposes, namely: the promotion or dissemination of proven technology, rectification of an identified constraint and staff development.

a) Demonstrations for the promotion and dissemination of proven technology

One of the major problems militating against increased, sustained and profitable agricultural production is a lack of use or misuse of proven technology available at present. A lot of literature is available on cultural practices, and adjusting, setting and maintaining agricultural machinery and anciliary equipment. However, this knowledge is either not used, or is wrongly or partially used by farmers. It is the duty of extension staff to promote what the extension department has available. There is no such thing as 'the farmers did not consult me'.
Promotional demonstrations should be a three pronged attack by government agents, e.g. AGRITEX and DR & SS, private organisations e.g. chemical, seed & fertilizer companies and innovative farmers. These farmers also serve as possible sources of research information. Such demonstrations can be carried out at training centres, on the farmers land or group allocated land. Production from the farmers' land or group land should go to the farmer or group to compensate their effort and the resources used.

b) Demonstrations for rectifying an identified problem

A participatory approach should be used so that the recipients identify the problems and priorities in their specific area. The problems could be late planting, soil erosion etc. It is important to carefully follow the programme planning cycle in an effort to use or demonstrate the right intervention to correct a problem. For example, demonstrating different planting dates may not solve the problem of late planting. The causes of late planting may be late delivery or unavailability of inputs.

c) Demonstrations for staff development

The best way extension staff can build confidence in their technical capacity is to be involved in demonstrations which could be conceptualized in one of the following ways:

i) the extension officer initiates a demonstration
ii) the superior challenges his subordinate to carry out a demonstration

iii) the organization directs that a demonstration be carried out.

The extent and limits of such demonstrations will depend on the availability of resources whose costs should be borne wholly by the government. Such resources include land, time, labour and capital which should be made available on time. It is, therefore, recommended that Provincial, District and Ward training centres with a land area of about two hectares be established for purposes of hosting this type of demonstration.

Demonstration strategies

First and foremost, conferences like this workshop should have a mirror image at the district level. We are definitely speaking to the converted at this level and it appears more and better resources are used at this level than at the operational level of extension officers. District Workshops on research and extension demonstrations should be programmed for 'grassroots' extension workers and farmer organizations. COFRE should also solicit direction from these organizations. Due to limited resources, an interchange of demonstration findings and recommendations should be encouraged between districts. COFRE should, therefore, strengthen the effective functioning of the present district libraries.

The following demonstration components and calendar of activities for extension workers and farmers are recommended:

a) Demonstrations on most field crops should be implemented in October/November and they should be aimed at intervening into the specific problems confronting farmers, promotion of technology or staff development.

b) Promotional demonstrations should be held in March/April and concentrate on showing farmers the results of technology in the field. These are normally reinforced by field day, and discussion groups and should receive extension support from senior members of COFRE at the national level.

c) Demonstration workshops should be held in June/July and should focus on evaluation and then re-planning. The proceedings of these district workshops should be attractively and simply bound and made available quickly to extension workers and farmers. Well documented reports will avoid the duplication of effort and help people build up on what has been done already.

Conclusion

Demonstrations are a strong intervention strategy for developing staff, promoting ideas and solving the farmers' problems. If demonstrations by extension staff are to be meaningful and serve their purpose, then resources should be provided on a timely basis.

Owing to the low literacy level of most communal farmers, demonstrations should focus on one theme at a time. There is great need to review and restructure our demonstration strategies so that more attention and resources are available to the extension workers and farmers.

Demonstration and training centres should be established at province, district and ward level.

Finally, to quote Abraham Lincoln, 'Government of the people, by the people, for the people'. Similarly, the extension officers' demonstrations should be demonstrations of the people by the people for the people and not demonstrations OFF the people, demonstrations that BUY the people and demonstrations FAR away from the people.

Discussion on paper

Rapporteur: A.Z. Chiteka
Discussants: B.G. Mombeshora and O.J. Zishiri

1. We feel the paper should have been more explicit. The real question is, Should all extension officers in the service host their own demonstration projects for staff development, the promotion of technology or problem rectification? To answer this, the paper should have reviewed the current state of the art to enable one to establish whether the one extension officer, one demonstration strategy was working or not. It is only with such information that one can establish the degrees of success, the problems encountered and whether they can be resolved. In its present format, the paper seems to be describing an ideal situation which raises a number of questions, unanswered owing to lack of practical data. For example, the author states that 'a lot of literature is available on cultural practices etc but this knowledge is not used by farmers' Is this because the farmer is not interested or because he is constrained by other factors? There is also mention of the need to make inputs and other resources available on time. No discussion is done on how serious the problem is and whether it would be possible to meet this requirement across all extension officers' areas.

2. A reasonable description of the types of demonstrations based on objectives has been given. However, there is no indication in the subsequent discussion as to which type of demonstration the 'one extension officer, one demonstration strategy' currently places more emphasis on.

General discussion

1. Some discussion centered on the question of the policy that each extension officer must carry out at least one demonstration. It was queried as to whether this directive is appropriate, since it assumes that there are so many things that can and need to be demonstrated and that, irrespective of the circumstances, one or more demonstrations have to be conducted by each officer.

2. There was some debate on the size of demonstration plots. The current recommended size is 0.2ha. It was finally agreed that this is adequate and should be maintained.

3. The proposal to establish a 2 ha demonstration centre in each province was supported. It was noted that such a centre would go a long way towards meeting extension objectives. However, substantial funding would be needed to establish such centres. In the meantime, visits to research stations by communal area farmers should be encouraged.

4. It was reiterated that subject matter specialists in AGRITEX be the linkage point for research officers from DR & SS in conducting communal area trials. It was, however, pointed out that many subject matter specialist posts are currently vacant and that of those filled most are manned by inexperienced personnel. Their effectiveness in co-ordinating COFRE work would be limited at this stage.

5. Inputs like seed, fertilizer, etc required for trials and demonstrations are inadequate. Frequently, they arrive late, resulting in failures to demonstrate the technology effectively. It was noted that the financial allocations for procuring these inputs is limited and the director of AGRITEX has to ensure that adequate funds are sought to enable COFRE to do the work effectively.

6. It was suggested that guidelines on experimental procedures be formulated and written for the benefit of all involved in conducting trials or demonstrations. The COFRE chairman indicated that work is currently underway on such guidelines.

7. It was suggested that problem areas be clearly documented for the benefit of both extension and research staff. and that surveys should be conducted to arrive at specific problem areas.

8. It was noted that the communication of comments about proposed trials and demonstrations was too slow. Comments about the projects were reaching the originators long after the projects had in fact been implemented. The COFRE chairman was asked to ensure that the comments reached the project initiators early enough to ensure that the necessary changes were made.

9. Horticulture plays a major role in the diet of communal area farmers. The government has recognized the importance of improving research on horticulture. None of the trials or demonstrations have made any reference to horticultural crops. There is, therefore, a need to increase work on horticultural crops in COFRE.

THE ROLE OF VERIFICATION TRIALS IN THE RESEARCH/EXTENSION CONTINUUM: HOW CAN SUCH TRIALS BE MORE EFFECTIVE?

S. Alibaba
Provincial Agronomist, AGRITEX

Introduction

To most observers, the term 'verification trial' must come as a suprise since various terms have been coined by the Committee for On-Farm Research and Extension (COFRE) over the past few years. In order to understand this type of trial, one should go back in time to see exactly how such trials were born.

During COFRE meetings, field trips and workshops, it became evident to research and extension senior staff that there was confusion on which agronomic practices 'grass roots' extension workers should extend to farmers. Crop production recommendations varied from province to province, and in some instances, they had become outdated. It was against this background that an attempt was made to produce a booklet with broad agronomic recomendations for a number of crops by teams of relevant researchers and extension staff under the COFRE umbrella. Recommendations on the production of maize, sorghum, rapoko, mhunga, groundnut and sunflower were then produced. Unfortunately, this exercise resulted in recommendations that, in some cases, differed greatly from current farmer practice. Hence the need by senior research staff to verify the biological and economic worth of the proposed production packages.

Different terminology in use and where verification trials fit

Before going into the role of verification trials in the present situation, it is essential to have a clear understanding of the jargon that has been liberally used by both AGRITEX and DR & SS in recent years. These include terms such as 'on-farm trials/research', 'demonstrations', 'observations' and 'verification trials'.

The term 'on-farm trials' applies to the process whereby researchers carry out trials on the farmer's field. At present, two fairly opposite types of on-farm research involving on-farm trials are in progress in Masvingo province. The first consists of the farming system research approach where research starts by attempting to understand the farmers' practices, perceptions and technical knowledge and then uses this information to help identify the technical possibilities and research issues that improve his productivity. The second approach is the more conventional form of research where promising technologies from the station research are put in on-farm trials duplicated over a number of sites with uniform treatments throughout the country, and several sites in Masvingo province.

The term 'demonstration' implies a situation where farmers are given an opportunity to see how a particular technology works in practice. In this instance, only tried and tested technologies are demonstrated to farmers. Technologies that are suspect and not fully understood have no place in this method of knowledge transfer from the extension agent to the farmer. In most cases, these demonstrations are very simple and involve few (2-3) treatments or alternatives.

The term 'observations' has been used by researchers and extension personnel to refer to work done in situations where very little is known about how a particular technology will perform under local conditions. In such cases, the researcher/extension agent would like to confirm the superiority of the technology before extending it to other areas. An example can be that of a new maize variety which may have been bred for a particular Natural Region but which farmers and extension staff would like to observe in performance on a small scale before making any changes to their variety mix or incorporating it into widespread demonstrations. The verification trial is fairly similar to observation plots, but the researcher/extension agent is now trying to be precise

by quantifying the benefits of the technological innovation he is attempting to introduce under farmer management conditions. In such trials, a number of options are tested.

Verification trials in the context of COFRE

This section discusses why verification trials were perceived to be necessary, the role they play in the extension/ research continuum and the opportunity they afford researchers and extension personnel to interact with the farmer and his farming system.

As discussed earlier, verification trials were born out of the need to improve the content of extension messages passed on to farmers. COFRE meetings and follow up field visits established that some of the information being passed on to farmers was inappropriate and sometimes outdated. This partly arose from the fact that past research work had concentrated on the large-scale commercial farmers whose circumstances were completely different to that of the small scale-farmers.

The first COFRE verification trials were initiated in 1988/89. At first, as with most new ideas, confusion reigned about the role of such trials. Many people were concerned that this additional link for an already long chain would delay the transfer of technology from the researcher to the farmers. On the contrary, verification trials are not aimed at hindering the transfer of technology but at fine-tuning technologies in order to generate more appropriate recommendations for the majority of farmers who are often found in the more marginal cropping areas. They also give the extension agent an opportunity to have hands-on experience with the new innovation and provide him and the farmers with the opportunity to observe the new innovation within their physical environment, to compare it with current practices, and, finally, to comment and advise on how the innovation can be made more appropriate for targeted farmers through further fine tuning.

Verification trials also afford the farmer, researcher and extension worker an opportunity to meet, particularly during the annual evaluation visits. This enables the researcher to better appreciate the circumstances and perspectives of the farmer. A dialogue between the farmer and the researcher augers well for the resolution of the farmers' problems. As mentioned earlier, it is essential that the researcher works closely with targeted farmers throughout the research process to hasten technology generation and the transfer process. Failure to do this only gives weight to those who feel that verification trials may actually delay the technology transfer process. It is hoped that verification trials will only be used to fine tune potential technologies and not as a screening exercise for on-station research. They have a role in a more integrated approach to problem solving, where all the actors (farmers, extension agents, researchers, social scientists and economists) are involved from the beginning to the end.

Verification trials also allow for more interaction between the farmer and the technology under testing since farmers validate it against their current practice. Verifications give the farmer time to analyse why certain components do not work and affords him an opportunity to try out some of the practices or components he finds useful.

However, the verification exercise in its current format has not done enough to find out more about the farmer and his farming system. It has neglected this aspect as shown by the fact that most recommendations remain somewhat too broad with no fine tuning done to meet the needs of farmer groups.

Possible ways of improving the verification effort

Verification trials are still relatively new in Zimbabwe and improvements can be made to make results more meaningful by considering the following points:

All research carried out at the various levels must of necessity start and end with the farmer. This implies that

more emphasis must be given to diagnosing production problems and applying the solutions. A diagnostic survey should precede all verification trials. At present, the greater part of on-farm trials are conducted using classical on-station approaches and many attempts to move on-farm have resulted in 'mini research stations' being established. In some cases, crops grown at such sites have no resemblance to what the farmer is growing. The Farming Systems Research Unit should be invited to participate in these Verification Trials since it works closely with farmers. Coupled with this, AGRITEX should spend more time analysing farmer circumstances before attempting to do any work in the farmer's field. To this end, the extension agent on the ground should be given more training on diagnostic approaches to problem identification and solving to enable him to modify recommendations to suit local circumstances.

More training should be given to local extension staff on the concept of verification trials. The staff at this level have shown an ability to lay out and manage verification trials but lack an understanding of why such trials are done. Additional to this, middle management extension staff at the district level should be more involved in the process from the beginning to the end and not only during implementation. They should also participate in diagnosis. Furthermore, more farmer involvement is necessary if knowledge of his environment is to be incorporated. Farmers should feel that verification trials are there to solve their real problems.

Discussion on paper

Rapporteur: A.Z. Chiteka
Discussants: I.M. Mharapara and G. Rabey

1. The author states that when verification trials were initiated 'confusion reigned'. This, we believe, is a serious admission because it indicates a lack of planning and involvement in planning of all people who were to undertake the trials. Having identified the need to initiate such trials (which we don't believe are necessary), all those involved should have been fully briefed on why they were to be implemented, what was intended to be achieved and exactly how to go about running them. Failing to do this can result (and has to a certain extent resulted) in a waste of limited resources.

2. The author goes on to explain on-farm trials, demonstrations, observation trials and verification trials. He points out that some crops grown in on-farm trials have no relationship with the farmer's problem. This is again a waste of time and resources and every effort should be made to avoid it. However, we don't agree with the author's definition of 'observations'. To us, observations should form the very beginning of any research programme in that any idea of a new technology or innovation is compared with the existing standard practice to see if there is any merit in it and, therefore, the need to initiate a full research programme or project. Demonstrations are the vehicle which should be used to provide experience and show clients the effect of new technology.

3. We agree with the author that only tried and proven technologies should be demonstrated. The sad thing is that very little of this is actually being done today. We see the research/extension continuum sequence as follows:

    a) Observation trials or diagnostic surveys to determine the need for embarking on a particular research programme.
    b) On-station formal trials to generate the new technology or innovations.
    c) On-farm trials to test the appropriateness of the new technology under a range of farming conditions and environments and make any necessary changes to suit the local environment.
    d) Having completed a series of on-farm trials (in which the extension agent should have been fully involved, to be fully conversant with the innovation), make appropriate recommendations where applicable.
    e) Set up demonstrations as teaching aids so that the farmers can see for themselves the benefits of the recommended practice and assess the applicability of it to his own circumstances. This should be largely the responsibility of the extension agent (as it is a teaching process) but with some in-

volvement of the researcher.

4. As discussed at length over the past couple of days, the link between DR & SS and AGIRTEX should be at the Research Officer/Subject Matter Specialist level and we fully endorse this. If this link exists and works correctly, there may be no need for verification trials because, following the system we have outlined, they would duplicate efforts.

General discussion

1. Some debate centred around the principle of verification trials. If a technology has been developed and proven to be successful, then there is no need for a verification trial; only a demonstration would be required. This, however, assumed that the technology has been widely tested at sites, including the farmers' fields. It appears that some research work on the farm may in fact be termed verification (e.g. as the term is applied in the CIMMYT concept of on-farm research), while it is a continuation of evaluation of the technology under real farm situations.

2. It was agreed that some mistakes had been made in the verification process as presented in the paper. For example, fertilizer recommendations included in the COFRE package for certain areas were reported to be too high. The basis on which the recommendations were formulated was thought to be suspect. Likewise, the reasons why the recommendations were regarded as too high were not given. Some AGRITEX officials felt that some recommendations did not take into account the costs involved versus the yield achievable in the low potential areas. Furthermore, the recommendations did not make adjustments where manure is also applied.

3. When technologies are introduced, a careful analysis of the possible repercussions should be conducted. This helps to avert possible retrogressive effects, if the technology is examined within a socio-economic context.

4. The involvement of non-governmental organizations at the farm level has presented problems. The biggest problem is the advertisement and subsequent marketing of untested crop varieties to unsuspecting small farmers with resultant crop failures. A National Variety Testing Service must be set up so that private companies submit their varieties for testing before getting a permit to market them.

CLOSING REMARKS

R.J. Fenner, Director, DR & SS

First of all, I wish to compliment the gathering on the standard of debate. If the rapporteurs have captured the atmosphere of the discussion, it will add much to the value and quality of the proceedings of this workshop.

Just a couple of general remarks before I comment on COFRE itself. They are precipitated by comments made by AGRITEX personnel.

First of all, great play has been made on the need to increase productivity and production in the small farm sector; but we must not forget that research to maintain productivity is just as important. For example, DR & SS has recently released a new soyabean variety. Its yield potential is little different from the previously released variety, but it has greater resistance to leaf diseases, an increasing constraint to the maintenance of yield in that crop. Secondly, another undercurrent has been evident. What type of trials should be laid down on-farm, formal or informal, simple or complex, few observations, or many measurements? I think it is natural for a researcher to want to obtain the maximum information from his work. I recommend caution in approach to the planning of complicated trials. The initial costing may prevent it being approved even though the basic hypothesis needs to be tested. Furthermore, the ranking of many observations can lead to the state of mind that a trial is of no value unless all the information can be subjected to mainframe computation; that is, let us number crunch and see what comes out. It was pointed out by one speaker that if the results are not obvious, the findings are unlikely to be adopted. I cannot go that far. I would say if a PC cannot handle the data, think again.

The Director of AGRITEX informed us that his Department was diversifying into allied agricultural fields and he asks for the indulgence and help of DR & SS. In the same vain, DR & SS must also not go about its business in blinkers. We are not only researchers; we are part of the community as a whole.

COFRE is working but it is still evolving. This was clear from our long discussion on its structure, its linkages (from decisions made to implementation at the farm level), and the need to change officers' attitudes towards the committee.

However, COFRE is not the solution to all current constraints within AGRITEX and DR & SS. Not only that but a workshop like this cannot meet all expectations; yet it does provide a forum to initiate future dialogue.

Nevertheless, we still need to address the budget issue to ensure that on-farm trials continue at a meaningful level. But the farmer, our client, must never be forgotten. Logically, this leads to the need for mechanisms to be devised to assess the success of our efforts on agricultural productivity at the farm level.

Finally, the traditional round of thanks: to the contribution of our guests from CIMMYT and ICRISAT; to IDRC for their generous financial assistance; to the Chairman of COFRE and his staff for their input; to the management of the Kadoma Ranch Motel for the services provided; and to you all for your friendly attendance.

I wish you all a pleasant and safe journey home. May your God go with you.

I now declare this workshop officially closed.

SUMMARY OF WORKSHOP RECOMMENDATIONS

1. Revison of the COFRE structure

   a) The missing link:

   It was agreed that the main linkage point between research and extension should evolve around the Subject Matter Specialist in AGRITEX and research officer in DR & SS. The two departments should facilitate this by:

   - Recognising and facilitating the work of the subject matter specialist in AGRITEX as the link between researchers and AGRITEX;
   - Encouraging and supporting research station tours by AGRITEX provincial staff and selected farmers;
   - Giving material and financial support to the COFRE chairman and his sub-committee convenors to have regular contact and interaction with ROFREC;

   b) Strengthening the COFRE office by

   - Extending the period of COFRE chairmanship from one to two years to ensure continuity;
   - Linking the COFRE office to the liaison office in AGRITEX and information office in DR & SS in order to lessen the chairman's workload;
   - Providing material and financial support to enable the office to fulfil its liason and monitoring roles. In this regard, it was proposed that a COFRE project document be written and circulated to potential donors for possible funding.

2. Improving information exchange capability between DR & SS and AGRITEX through:

   - The DR & SS and AGRITEX on-farm project directory, which is working well at the moment. However, an inventory of activities of other non governmental organizations involved in similar work should be documented, possibly through the AGRITEX liason office.
   - A COFRE annual report on on-farm project results. Although the absence of such a document has been the major weakness of COFRE to date, the 1989/90 report should be published later this year. To help improve the content and level of analysis in such writeups, COFRE and CIMMYT will mount a workshop on 'COFRE Trial/Demonstration Assessment' for DR & SS and AGRITEX officers in October 1990.
   - A COFRE manual on 'Guidelines on planning, designing, implementing, harvesting, analysing and interpreting results from on-farm demonstrations' to help improve upon the quality of AGRITEX on-farm demonstrations should be produced. To this end, a small technical committee consisting of DR & SS and AGRITEX officers and the CIMMYT Regional Agronomist was set up and tasked with the publication of the manual by the end of this year. This effort should be complemented by running courses on site selection, demonstration layout, management, etc. at research stations for AGRITEX staff at the province level.

3. Revising the format for submission and processing project proposal forms in order to reduce the observed time lag between project proposal evaluation by COFRE and the implementation of COFRE subcommittee recommendations by project originators, and through:

- Calling for project proposals earlier, say around March/April each year;

- Reversing the existing proceedure of calling for on-farm research components from on-going projects each year (around July/August), except in situations where new projects are proposed or amendments made to existing ones.

4. Strategies in the face of budgetary constraints.

   - Greater emphasis on prioritising projects that should go on farmers' fields and, maybe, concentrating on case studies rather than spreading limited resources over the whole country.

   - Mimicking some of the on-farm trials on stations and then holding field days for farmers, extension staff and policy makers.

   - Conveying the importance of agricultural research (espécially on-farm research) to policy makers through submitting reports that emphasize the returns from investing in such an activity.

   - AGRITEX should move away from insisting that each extension officer conduct an on-farm demonstration project each year and towards a policy whereby such projects are conducted only when there is a priority problem to be addressed.

   - More diagnostic skills training is needed for AGRITEX staff to enable them to assess communal farmers' problems better. This will greatly assist DR & SS with the prioritization of their work.

5. Improving the analytical frame-work for on-farm project results by:

   - Incorporating a socio-economic and risk evaluation in the analysis;

   - Putting in place a mechanism that helps COFRE to assess the success of the current on-farm research and extension efforts on farmer adoption and productivity;

6. Increasing the number of on-farm projects on livestock. It was recommended that multi-disciplinary teams of research and extension officers should design and submit well costed project proposals to COFRE, which would then seek outside funding for such projects.

List of participants

From DR & SS

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