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FARMING SYSTEMS RESEARCH AND NARC MASTER PLAN

REPORT III

- ACHIEVEMENT INDICATORS
- ACCOMPLISHMENTS
- ISSUES AND RECOMMENDATIONS

A Consultancy Report

by

MURRAY D. DAWSON
Farming Systems Research Consultant

September 1991

PARC • USAID • MART • WINROCK

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A

The MART (Management of Agricultural Research and Technology) Project is funded by the United States Agency for International Development (USAID). The MART Project's chief link to the Government of Pakistan is through the Pakistan Agricultural Research Council (PARC). A MART Project Coordination Committee composed of federal, provincial, and university representatives coordinates and guides project activities. Its purpose is to assist the Pakistani agricultural research system to strengthen its research management capabilities, and to improve communications, training, farming systems research, arid zone research, and research in the rural social sciences. Winrock International, through a contract with USAID, has responsibilities to assist with the first four of these tasks. Two international agricultural research centers, the international maize and wheat improvement center (CIMMYT) and the International Center for Agricultural Research in Dry Areas (ICARDA), are responsible for the other two tasks.

The mission of Winrock International Institute for Agricultural Development is to help reduce poverty and hunger in the world through sustainable agricultural and rural development. Winrock International assists people of developing areas - in Asia, Africa and the Middle East, Latin America and the Caribbean, and the United States - to strengthen their agricultural institutions, develop their human resources, design sustainable agricultural systems and strategies, and improve policies for agricultural and rural development. As an autonomous, nonprofit organization, Winrock International provides services independently as well as in partnership with other public and private organizations. The institute is recognized as a private voluntary organization.

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Acknowledgement

The consultant wishes to express profound thanks to Dr. Zafar Altaf and Dr. Munawwar Sial, Chairman PARC and Director-General NARC respectively for their encouragement and support during this consultancy.

Thanks are also due to all FSR Directors and Coordinators in each of Pakistan's Provinces. Their patience and perseverance in expanding the FSR approach and assessing impact, especially upon improving the lot of small farmers, is much appreciated.

To our MART project colleagues and USAID/ARD Program Officers Dr. Ron Senykoff and Dr. Dennis Weller I remain greatly indebted for their guidance and support. Many thanks also to my FSR consultant associates Dr. Roger Peterson (Biometrics) Dr. Vander Veen (Ag. Economist) Dr. Daud (Horticulturist) and Ms. Bushra Tariq (Women Component). Their contributions throughout Pakistan are noteworthy.

Special thanks are expressed to the FSR Coordination Cell under Dr. Mansab and to the NARC Institute Directors, Administrator and Scientists. Our challenge remains, namely, to develop NARC into a Centre of Excellence in Agricultural Research and to concurrently institutionalize FSR.

EXECUTIVE SUMMARY

1. a) The evidence is in that FSR Projects in each province have captured the interest of agricultural scientists, administrators, private firms and farmers. Adoption by farmers of introduced improved technology is presently being documented. Private farm machinery and seed companies, nurserymen and agricultural chemicals and veterinary suppliers are participating in many of the FSR target areas. The three Agricultural Universities are providing training, internships and curriculum changes to accommodate FSR experience. But institutionalization of FSR remains to be realized.

   b) The objective of a permanent resource base that supports FSR on a sustainable footing has been pursued during this consultancy. Strategies have been articulated for FSR participating institutes and universities in each province to prepare their respective FSR/PCIs. Ideally provision should be made in each PCI for a FSR Development budget at least initially derived from ARP II funds. MART assistance in writing PCI is needed.

   c) In order to accelerate farmer adoption of improved system technology several Pilot to Production projects have been initiated in partnership with private firms and agricultural extension department. Most notably, in selected areas of the Punjab's wheat-rice system, the zero-till drill accompanied with other crop and livestock improved technologies are under study.

2. a) An equally important component of this consultancy was to assist reactivate NARC. A precious resource of more than 100 young scientists returning from abroad with Ph.D degrees demands that a swift improvement in the professional scientific environment be carried out.

   b) A new impetus to interdisciplinary studies that address production constraints and use a systems research approach should be emphasized. Clear goals, precisely stated research priorities, research operation funds, simplified regulations and efficient support services which provide positive reinforcement to the researcher are still needed.

3. The report articulates alternative strategies to reactivate NARC. Appointment of a full time DG/NARC with effective deputies, is essential. Focus on one or two research thrusts with defined outputs, upgraded support services and an effective Review/Monitoring Cell constitute other bottom-line requirements.

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1.0 INTRODUCTION

1.1 Past and Present:

Technical change in the developed world has proved Malthus wrong during this century. Unlike the Western world where agricultural scientists have become latter-day heroes, Pakistan, a developing country, has yet to realize such a claim.

Historically, agricultural research in Pakistan has suffered from shortage of qualified staff at the national and provincial levels, poorly defined research priorities and lack of equipment and facilities. Today NARC has largely overcome these constraints but deficiencies remain. No permanent Director General, insufficient focus on priority problems, inadequate operational funds and an antiquated financial/procurement management system discourage effective research.

A new impetus to interdisciplinary studies that address production constraints and use a systems research approach is to be emphasized. Clear goals, precisely stated research priorities, research operation funds, simplified regulations and efficient support services which provide positive reinforcement to the researcher are still needed. A systems approach to research deserves to be advanced.

The evidence is in that FSR Projects in each province have captured the interest of scientists, administrators, private firms and farmers. Adoption by farmers of introduced improved technology is presently being documented. Private farm machinery and seed companies, nurserymen, agricultural-chemicals and veterinary suppliers are participating in many of the FSR target areas. The three Agricultural Universities are providing training, internships and curriculum changes to accommodate FSR experience. But institutionalization of FSR remains to be realized. There is an urgency for PARC and each Province to develop a FSR/PCI.

1.2 Nature and Scope of Consultancy:

This report considers strategies to reactivate NARC and articulate achievements and progress in FSR institutionalization. Strengthening linkages with the private sector and advancing accelerated farmer adoption of improved technology is also discussed. Specific Terms of Reference for the FSR consultant are provided in Annex I.

2.0 QUANTIFIABLE INDICATORS

A. Farming System Research

2.1 Training Workshops/Seminars:

During 1991 ten Workshops and Seminars have been planned and/or conducted. Each is supported under the Incountry Training Component of the MART Project. Evaluation of each training workshop is carried out. A list of the FSR Seminar and Workshop topics is given below:

FSR Workshops and Seminars for 1991

	Tentative Titles	Location	Instructions
1.	Improved Poultry Husbandry for Fatehjang Village Women.	Fatehjang	Ms. Bushra PRI Scientist Dr. Vander Veen
2.	Farm Profitability Analysis Workshop for FSR Participants (Punjab)	Faisalabad	Dr. Vander Veen Dr. Bashir
3.	Experimental Design and Statistical Analysis for On Farm Research	NARC and Quetta	Dr. Peterson
4.	Improved Orchard & Vegetable Husbandry and Linkages With the Private Sector in NWFP	Mansehra	Dr. Daud
5.	Ditto in Balochistan	Quetta/ Kanak	Dr. Daud
6.	Zero Tillage in Wheat Rice System - Impact Assessment and Future Strategies	Gujrat/ Sialkot	Dr. Vander Veen N.I. Hashmi, Chathah et al
7.	FSR Review and Work Plans for Sindh 91/92	Karachi	Dr. Dawson and Dr. Mansab Ali

8.	FSR Activities in NWFP	Mansehra	Rauf Khattak Dr. Vander Veen Dr. Roger Peterson
9.	FSR Review and Work Plans for Balochistan 91/92	Quetta	Dr. Bajoi Dr. Dawson Dr. Vander Veen
10.	FSR Travelling Seminar	Punjab NWFP	Dr. Mansab et al

2.2 A/V Technical Modules:

The FSR scientists through short term consultant Dr. Asghar Jalis have collaborated with the NARC Communications Unit in producing these modules. Dr. Anwar Hassan, Director AVC, Dr. Cordell Hatch, MART Project AVC Consultant and the FSR National Coordinator have jointly prepared a schedule which targets no less than seven A/V FSR Technical Modules, with radio talks on specific topics. These modules written in English and Urdu, aim at accelerating improved technology transfer to the small farmer. Topics and scheduled completion dates are given below:

S.No.	Module Title	Peer Reviewer	Script	Factsheet	Date
1.	Urea Treated Straw	Completed	Completed	Completed	
2.	Ensilaging green fodder	Dr. A.G. Khan Mr. B. Bhatti	Y	Y	Sep. 5
3.	Multi-cut Sadabahar	Dr. T. Izuno Dr. A. Rehman	Y	Y	Sep. 20
4.	Zero Tillage	Dr. N.I. Hashmi	N	Y	Sep. 25
5.	Munghean in Wheat-Rice System	Dr. B. Malik	Y	Y	Oct. 7
6.	Poultry Keeping	Mr. Arshad Shah	Y	Y	Oct. 15
7.	Pest Management in Household Grain Storage	Mr. Irshad	Y	Y	Oct. 20
8.	What is FSR?	Dr. Dawson	Y	N	Oct. 25
9.	Production of Pure Wheat Seed	Dr. Shahid Masood	Y	N	Oct. 30

The FSR National Coordinator Dr. Mansab Ali is supposed to handover these scripts/factsheets to the Director, AVC and Publications simultaneously.

2.3 Pilot to Production Projects:

The following FSR Pilot to Production Projects have either been initiated or planned:

1. Improved Technology with Zero Tillage in Wheat-Rice Systems of Punjab.

2. Improved Husbandry for Sheep and Goats in the Fatehjang Area.

3. Increased Egg Production and Income for Fatehjang Village Women With Improved Poultry and Grain Storage Technology.

4. Expanded Fruit Production From Selected Orchards in Mansehra (NWFP) and Kanak (Balochistan).

Planning, Monitoring and On-Going Evaluation Report prepared by Marlin Van der Veen, Agricultural Economist and MART/FSR Consultant, quantifies achievement indicators in given time frames for each Pilot to Production Program.

2.4 Rural Women and FSR:

Three FSR Rural Women Projects are at various stages of development. They will be monitored to measure beneficial impact on village family welfare. These projects are:-

- Improved poultry and egg production and household pest control practices in Fatehjang.
- Ditto in Mansehra.
- Improved poultry and other agricultural practices for women in Kanak.

2.5 Impact Studies on Farmer Adoption of Improved Technology:

A detailed FSR impact study is being carried out at Mansehra through joint TIPAN/MART collaboration. Other FSR target areas using Vander Veen's reports will facilitate carrying out on going evaluation. Farmer adoption impact studies will include linkages with private firm input/output services.

2.6 University Curriculum and FSR Course:

During 1992 a conference is planned to assess the degree to which course content and curriculum has been influenced to accommodate training in the FSR approach and methodology.

B. NARC Master Plan Implementation

2.7 leadership and Organization:

- Ensuring the appointment of NARC Director General and Deputies during 1991 and drawing up of TORs for senior administrative officers is scheduled.

- Clear articulation and understanding of relative roles of Institute Directors is expected and their organizations and functions are expected to be laid down.

2.8 Research Programs:

- Identification of one or two research thrusts which NARC may address during 1991/92.

- Reallocation of resources, support services and operational funds to support primarily interdisciplinary programs. Projects with greatest potential to generate readily adoptable technology will be favored.

- A defined strategy to transfer, postpone or delete projects not considered a priority will be articulated.

3.0 ACCOMPLISHMENTS:

A. FSR APPROACH AND TECHNOLOGY TRANSFER

3.1 FSR Project Reviews and Recommendations:

3.1.1 Balochistan (Kanak)

Farm production constraints at Kanak

Agronomy	Availability of wheat seeds like Pak 81 and potato (var Diamond) and fodder grasses.
Plant Protection and Horticulture	Apple orchard coddling moths, inadequate pruning, bark canker/cracking, excess irrigation.
Livestock	Internal & external parasites and poor winter feeding of small ruminants
Agro-forestry	Insufficient fuel wood and erosion by wind and water.
System features	System interactions measurements and analysis.
Socio-Economics	Diagnostic survey on role of women in FSR target area. (Needs an interdisciplinary team follow up)

Recommendation:

Dr. Bajoi should request all FSR scientists to prepare brief reports which require each participatory scientist to list his major constraints (with reasons) in carrying out FSR plans. Opposite the stated constraints would be an indication of the scientists strategy needed to resolve the constraints, with estimated resource and training needs.

Validated System Interventions now being readily adopted by farmers.

- Improved quality seed for wheat, potato, onion and treated cumin.
- Improved pest spray schedule.
- Better orchard husbandry, especially insect control, water management and tree pruning.
- Wider use of vaccine and deworming depending on training and availability of medicines.

Recommendations:

1) Initiate in concert with larger farmers and private firms a viable seed production program together with improved on-farm storage. (Consult with Dr. Taki Izuno)

2) Initiate merger between FSR and adaptive research to commence in the Nasirabad Division/Jaffarabad District. Base work plan on directives prepared by Secretary, Agriculture Department.

3) Strengthen livestock/feed interventions in concert with agronomy.

4) Strengthen team work: (a) Dr. Anis develop seed multiplication program of superior fodder grass and (b) livestock scientists compare livestock preference/performance in a feeding trial, at both Experiment Station and with farmer participants.

5) Prioritize and recheck in the field, the observations regarding women's role noted in the Kanak area survey. Mobilize an interdisciplinary team and initiate simple intervention(s) for Kanak women.

FSR Results from Recent Interventions

Agronomy: Significant responses from improved quality seed of potato, wheat and onions. There is need to further assess total effect on total system.

Animal Science: Livestock weight gains of sheep drenched for deworming gave significant economic response over control. Farmers on their own initiative now drench sheep and goats according to recommendations.

Institutionalization of FSR in Balochistan.

Operational funding for FSR has been provided by USAID under the MART Project which is nearing completion. There is an urgency for a sustainable FSR funding base in Balochistan.

1) In collaboration with Secretary, Agriculture Department Dr. Bajoi should prepare a PC-I that would result in FSR being funded from the Balochistan Government's development budget.

2) Strategies which strengthen FSR linkages with Adaptive Research and ARP2 Projects would be developed by Dr. Bajoi with assist from Secretary of Agriculture.

3.1.2 Sindh (Hala and Tando Mohammad Khan)

FSR Interventions for Sustained Increase in Farmer Productivity at:

A. Hala System: Cotton-Wheat and Onion-Fallow-Onion

1. Introduction of improved variety and quality seed wheat (SARSABZ) cotton (NIAB 78) mungbean (20/21)
2. Increase NP fertilizer to recommended rates
3. Use of zero-till drill (wheat-cotton and onion-wheat)
4. Improved fodders and feeding
5. Integrated pest control in cotton
6. Farm management, economic & other surveys that provide continuous project monitoring

B. Tando Mohammad Khan System: Wheat-Rice-Sugarcane

1. Intercropping onions in sugarcane
2. Improved varieties and fertilizer (as at Hala)
3. No-till wheat after rice
4. Farm profitability, agricultural economic diagnosis, impact studies
5. Improved livestock feeding & fodder

<u>Recommendations:</u>

- More detailed measurements of total system interactions from each intervention are still needed:
  Examples: assess residual fertilizer effects and all system benefits from introducing short duration mungbeans.

- Impact assessment from farmer adoption of improved practices (especially zero-till) should be initiated by FSR Coordinator.

- Improve on farm livestock trials utilizing better design & priority improved feed/health interventions.

- Acquire or develop local cotton gins for small farmer to save improved quality cotton seed & monitor same (consult Agri-business, PARC)

- Upgrade realistic pest management system interventions.

- Expand partnership R&D activities with private firms.

SINDH FSR Women's Program holds great potential.

Recommendations:

- Update a clear focused Socio-economic survey of women activities in FSR target areas.

- The Sindh FSR Coordinator may request from National Coordinator PARC support for a Sindh Women FSR Workshop to include:

  - o A review of FSR Women Program in Fatehjang with focus on improved poultry husbandry.

  - o An upgraded diagnostic/rural women survey in FSR target areas of Sindh.

  - o A practical in-country training of rural women in improved FSR interventions based on careful prioritization of diagnosed constraints.

New FSR thrusts and system interventions with strengthened linkages to the private sectors

Recommendations:

- Initiate selected long term (two or three years) trials such as residual fertilizer through entire system.

- Expand several system validated technologies to include many farmers in a pilot to production campaign in partnership with private firms and extension.

- Articulate sound monitoring which provides feed back on performance.

Institutionalization of FSR in Sindh and throughout Pakistan

Recommendations:

- Prepare a PC-I which includes institutional resource support from Agricultural University, Agricultural Research Institute and Atomic Energy Agricultural Research Centre.

- Request PARC in concert with University Grants Commission to explore strategies which would be persuasive in adding appropriate FSR courses and curriculum in each Agricultural University syllabus.

3.1.3 Punjab (Shahkot - Proka):

Assess farmer adoption trends in the Shahkot FSR target area

Recommendation:

- In partnership with AERU et al promptly initiate an impact study on FSR interventions in the Shahkot area with special focus on lentil, sesame, sadabahar and other fodder/feed interventions. Note: Mr. Azeem, Dr. Nayyar.

Livestock interventions in FSR Projects

Recommendations:

That Drs. Hanjra and Dr. Nayyar together ensure:

- All animal husbandry (health/feed) and fodder/silage system intervention results and analysis for Shahkot and Proka continue as joint interventions with the same farmers.

- Strategies be articulated which indicate how above findings can be developed in concert with the private sector to accelerate farmer adoption i.e. feeds vaccines and deworming agents.

Agricultural-chemical use by FSR Project farmers.

Recommendations:

- The AERU and biological scientists from AARI and NARC combine to assess farmer use of Ag. Chemicals in the Shahkot area (especially herbicides).

- Define kind and rates of Ag. chemical use on selected crops with reasons for same. Note: Drs. Nayyar and Mansab/Azim (especially insecticides).

Potential advantages from promoting farmer Seed Improvement Association (SIA).

Recommendation:

- Drs. Nayyar and Mansab may arrange with Dr. Taki a meeting with Dr. M. Ali to investigate the progress and potential for SIA in Punjab FSR Project Target Areas.

Farmer adoption of Mott grass

Recommendation:

- Dr. Nayyar and Dr. Hanjra should initiate a farmer adoption of Mott grass impact study. The extent, process and reasons for farmer adoption should be articulated to guide future FSR fodder development strategies.

Institutionalization of FSR/Punjab

Recommendations:

- Dr. Nayyar and Dr. Hanjra shall draft a PCI for their respective institutions.

- Copies of draft will be sent to Chairman PARC through DG/NARC.

Punjab (Fatehjang):

FSR needs more system focus at Fatehjang

Recommendations:

- FSR team should concentrate on a system thrust in experiment design, data collection and analysis. The urgent need is for the agricultural economists and biological scientists to work in partnership to study and interpret system interactions resulting from interventions.
- Livestock and fodder scientists must now develop sheep/goat seasonal model that includes:

  a. TDN livestock feed needs on a fortnightly basis for the entire year (dry, milking and gestation periods).

  b. Scientists with assistance from FSR field workers must obtain from selected farmers precisely fodder fed (or grazed) on a fortnightly basis (quantified) throughout the year.

  c. Scientist(s) should then superimpose quantified data i.e. TDN/DM production and livestock needs (see a and b above) on actual total fodder, etc. fed to the animals on a fortnightly basis.

  d. Animal feed deficits will be quantified. Animal scientists and economists can formulate and test the biological and economic performance of selected feeds (fodder, silage, concentrates, etc.) given the animal during defined periods at calculated feed levels.

  e. Expand deworming and vaccination into a pilot to production project in partnership with the private sector and extension (See Planning, Monitoring and Evaluation study by Vander Veen et al)

Livestock system interventions require integration and system analysis.

Recommendations:

- Classify interventions with small ruminants according to landlord/landless holder farmer and farmer tenant.

- Diagram accurately by month the major traditional cropping systems including ranges being used at present.

- Sketch on the figure precisely where, and what system improved interventions are planned. Show where and when all interventions are to be made. Indicate in work plan measurements to be taken.

- Animal scientists should team with agronomists and agro-forestry experts to prepare figures which illustrate for each month:

  - o What feed sources, where located and when fed to livestock under traditional and present practices.

  - o Superimpose planned feed and health interventions.

3.1.4 NWFP (Mansehra and other target sites):

Director of Outreach Dr. Rauf Khattak, encouraged by the Vice Chancellor etal and with TIPAN resource support now have FSR activities in Swat, D.I. Khan, and Kohat. Site coordinators presented results from system interventions based on diagnostic surveys.

Recommendations:

- The FSR Project designs should more precisely address prioritized and diagnosed constraints. Sharpened objectives, accurate record keeping and analysis be now emphasized.

- Director Out-reach, Dr. Khattak with TIPAN and MART support may initiate follow up workshops using Vender Veen and Peterson's FSR printed guide manuals (Economics, Statistics and Project Monitoring) as teaching aids.

Baseline diagnosis and impact studies:

Economic conditions, human expectations and employment are rapidly changing in Mansehra.

Recommendations:

- Vice Chancellor, Agricultural University, NWFP urges continuous diagnosis and interviews to be carried out in the FSR areas to assess progress and define opportunities.

- Dr. Gulfam with assist from Jan Baz will promptly provide the V.C. with a listing of all organizations/agencies operating in Mansehra rural development. A statement of function/mandate of each and a strategy for coordination thru FSR should be articulated.

FSR Institutionalization and PCI for NWFP

Recommendations:

- Director of Outreach etal with Vice Chancellor support willprepare a NWFP/FSR PCI.

- That the FSR/PCI be submitted for approval through appropriate channels to ensure development budget funding, concurrent with ARP II budget release.

Orchard and Bee/FSR Workshop - Dr. Daud etal

Recommendations:

- In preparation for the next workshop Dr. Gulfam will supervise selection of collaborating cluster orchards, identify farmers along with field men.

- Number of trees may be defined for training and follow up purposes.

- Private firms, nurserymen may be selected as workshop collaborators together with instructor assistants.

- Dr. Daud will assist NWFP scientists and Extension to quantify achievement indicators and establish a monitoring mechanism.

3.2 On Farm Experiment Design and Analysis:

A summary of Dr. Roger Petersen's manual used in workshop training follows:

The goal of on-farm trials is to measure the increase from a package of improved practices as compared to the farmer's practice. Basically this involves two treatments: F = Farmer's Practice, N = Improved Practice at a number of locations in the target area. The increase from the improved practice is then determined.

A test of the significance of the increase is based on an analysis of variance of the data from the trials. By determining the minimum increase, LSD, observed increases are then compared.

Experimental design will depend on whether the trial is concerned with crops or animals.

3.2.1 Cropping Systems

On-Farm Trials with Crops: The basic experimental design for crop trials consists of two large plots on each of a number of farms. One receives the farmer's practice (F).

Farm Operations: Supplementary Treatments may be superimposed in the trial, applied to small plots in the vicinity. The analysis of variance then takes place.

3.2.2 Livestock Systems

On-Farm Trials with Animals: The basic design for trials involving animals is called a cross-over, or simple reversal design of Improved Practice (N) and Farmer's Practice (F) over two observation periods. Animals are divided into two groups. The animals in one group receive the treatments in the sequence N ---> F.

Mean performance per animal is determined for each group during each period on every farm. These means constitute the data for analysis. The data may be tabulated and analyzed.

3.3 Farm Profitability/Economic Analysis:

A four day workshop was held in Faisalabad on FSR Trial Designs, Data Collection and Economic Analysis. (For Workshop details and Manual produced see Vander Veen's report August 1991) One Socio-economist, one plant scientist and one animal scientist were included from each FSR target area. Participants were expected to:

- have a general understanding of the research design and data requirements for the economic assessment of on farm trials which are planned and evaluated with a systems perspective.

- be able to choose and effectively employ the most appropriate budgeting or other analytical tool for assessing the suitability of agricultural technology being proposed or being tested in trials.

- explain and implement the data collection and evaluation strategies agreed upon to assess the suitability of new agricultural technology tested in on-farm trials concerning; (1) livestock and poultry and (2) annual crops.

3.4 FSR Pilot to Production Programs:

An abstract on present status of Pilot to Production FSR Projects is given.

3.4.1 Zero-till and Improved Wheat-Rice System

Planning workshop in Lahore during August to prepare for a pilot to production program based upon the zero till wheat seeder aims to:

- Define achievements and problems associated with farmer use and adoption of zero tillage in wheat-rice systems.

- Develop inter-disciplinary team competence in monitoring and evaluating impact from farmer adoption of improved technology.

- Articulate an action plan which could accelerate farmer adoption of improved technology in wheat-rice system based on zero tillage project experience.

3.4.2 FSR Women Poultry Project.

Planning of the Women's Poultry Production Training Course in Fatehjang aims to:

- Increase the levels of net income of rural farm women in Fatehjang by improving poultry production.

- Develop a practicable and sustainable model for improving the income of rural women that can be applied in other villages in Pakistan. Sustainability will be enhanced by establishing stronger linkages between the women and private enterprises for input and output marketing. (Links with other USAID women support projects should be strengthened).

- Develop and implement an appropriate monitoring and evaluation activity to provide ongoing information on program progress, impacts, effects, constraints and problems.

3.5 Institutionalization of FSR - A Sustainable FSR Program:

The urgent agenda in the internalization of FSR requires a shift from MART/USAID donor funding to establishment of both a development and ultimately non-development FSR budget.

3.5.1 Development of a PCI for FSR in each Province and PARC

Each provincial institution should now prepare a PCI under the coordinating umbrella of PARC.

Institutionalization of FSR nationally requires each institute/university/agency in each province to commit scientific manpower, technical assistance, support staff, an adequate budget and space to effectively conduct FSR at respective target areas. A clear policy is needed which defines expected roles and products of FSR. It is also necessary to develop a plan for building up the required institutional capacity in terms of staff resources and scientific and logistical support.

3.5.2 University Curriculum and FSR Training.

A sustained institutionalized FSR program throughout Pakistan's research system network will require rather drastic changes in the Agricultural University curriculum and training such as internship programs for students who, with more onfarm experience, could better understand the modest resources and constraints of the small farmers. Innovative changes in curriculum and training are proposed.

B. REACTIVATIONOF NARC MASTER PLAN:

3.6 Leadership and Organization

The profound organizational deviations from the NARC Master Plan deserve reconsideration.

It is clear that at this point the major cause for concern is lack of a strong Director General at NARC with full authority and support by PARC to carry out the mandate of that Centre. Unless this need is met expeditiously, it is hard to imagine how effective reactivation of NARC can take place.

3.7 Research Thrusts and Reduced Funding (Ref. Annex III)

Almost 3 years since the NARC Master Plan was published action is awaited to implement crucial plan recommendations. Drastic research budget reductions especially research operation funds, diminished donor support and greater expenses demands that NARC research be sharply focused. Research output, accountability to GOP is particularly important. A carefully articulated Research Thrust for NARC to which priority Master Plan identified research programs could address would be timely. Reallocation of resources and streamlined support services should follow. Indeed, one NARC Institution could develop the Model for good research management and measurable productivity targets. This would include improved Project formulation, prioritizing, reporting, and monitoring and evaluation which, will require no substantial additional funds. Implementation of an approved, prioritized set of projects with high probability of early pay-off basically means allocation of funds to favor those projects. It is a methodology to improve the probability of return on investment in research irrespective of the actual resources available.

4.0 ISSUES AND ACTION RECOMMENDATIONS

4.1 Strategies to Revitalize NARC:

Item (1): Leadership at NARC

Action:

The executive committee take appropriate action to promptly appoint DG/NARC.

It is clear that at this point the major cause for concern is lack of a strong director general at NARC with full authority and support by PARC to carry out the mandate of that Centre. Unless this need is met expeditiously, it is hard to imagine how effective reactivation of NARC can take place.

Item (2): A sharpened NARC research focus:

Action:

1) The executive committee appoint a high powered committee[1] to scrutinize research at NARC with the following mandate.

   a) To merge, postpone and/or eliminate research programs/projects such that NARC research effort for 1991/92 restricts its focus to but one or two research thrusts. (Annex II)

   b) Reallocate scientists, support staff and an adequate operational budget to the approved programs/projects that address identified research thrusts.

   c) Request Donor Agency to increase available operational funds for only highest priority projects consistent with the stated NARC research thrust.

   d) Establish a time frame with stated goals and a reporting procedure that provides for precise monitoring and desired follow up action to sustain high performance and farmer tested technology.

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1 Committee members include scientists/statesmen from the provinces and representations from Finance, Manpower Divs. and donor agencies.

2) Request representatives of the appropriate GOP sector to review all vacant posts allocated PARC/NARC and in concert with executive committee transfer or abolish low priority positions. (Budget savings from vacated posts may be used as operational funds for priority projects).

Item (3): Privatization of selected NARC services

Action:

The present governmental and international trend towards privatization suggests a need to examine alternatives to NARC management of certain services.

Transport:

Status: Continued breakdowns repairs and maintenance high costs and occasional accidents characterize the present institutional services.

Recommendation:

According to government rules appropriate action be taken to invite private firm tenders for defined NARC staff pickup and drop services.

Communication and Audio-Visual institution:

Status: The modern sophisticated communication services available in the new NARC Audio-Visual Building await full utilization.

Recommendation:

Develop NARC Communication and Audio-Visual Institute in the GOP public education network and promptly explore linkage with selected international and national private TV or A/V companies.

Procurement of Equipment and Supplies:

Status: Present rules and regulations contribute to a tedious and often inefficient NARC procurement service.

Recommendation:

A contractual arrangement with a private firm selected according to GOP rules/regulations be established for NARC procurement. Competitive tendering would be for specific procurement services.

Item (4): Budget and Financial Management

NARC Institute Directors & research program leaders need better budget understanding and ways by which financial management can be made more efficient.

Action:

1. Member (Finance) PARC may give orientation on research budget reappropriation and related matters. (Ref. Annexure III)

2. Each Institute/Director will develop its respective budget based on information provided in (1) above.

3. DG/NARC, in concert with the MART COP, will plan a forum to review the MART Project contractor's Finance Report.

Item (5): Role Play Practicum in Research Management

Action:

1. Initiate a role play practicum for NARC Institute Directors and program leaders to focus upon key issue in the Centre's development.

2. Through role play encourage key administrative, research, management and support service problems and topics to emerge though detached from personalities.

3. Appoint leaders to play roles in addressing problems, provide experience in conflict management and develop negotiation skills.

4. Transfer the experience and skills acquired in the role play practicum to the real life opportunity of democratically transforming NARC into effective leadership and research management model.

Item (6) A NARC Research and Program Management Model:

Provide a Model CRI for the entire NARC to emulate.

Action:

1) Analyze total budget (staff/operations) and scientific & support staff of CRI for 1991/92 with particular reference to research operation budget. (Ref. Annexure III)

2) Select research programs/projects from Master Plan that assume high priority in addressing approved NARC thrust.

3) Request all Institute Directors/key scientists to nominate scientists to join interdisciplinary teams.

4) Re-allocate budget staff as needed to conduct research.

5) Establish and monitor performance of both research and support services associated with CRI exercise. Define necessary remedial action procedure and responsibilities.

6) Request donor agency to assist plan, conduct, evaluate and multiply the CRI model experience.

4.2 STRATEGIES TO INSTITUTIONALIZE FSR IN PAKISTAN:

Item (1) FSR Sustainability: Preparation of PCI for FSR.

Action:

1. DG/NARC request FSR National Coordinator to (a) prepare a FSR, PCI for PARC and (b) assist each FSR participating provincial institute to complete FSR PCI drafts before December 31, 1991.

2. In collaboration with University Grants Commission assist Agricultural Universities to institutionalize FSR training, internships and curriculum.

3. Initiate a Conference at the University of Agriculture, Faisalabad during first quarter of 1992 to examine "Strengthening University Training and Curriculum in System Studies and Farm Experience".

Item (2) Pilot to Production FSR Projects

Action:

1. MART support PARC, FSR, ORP and Wheat Program, NARC, in collaborating with private firms and extension in accelerating use and monitoring performance of zero-till drill in defined wheat-rice system of Punjab.

2. With MART support, initiate a collaborative FSR/ORP pilot to production project in Fatehjang based on lessons learned. (Consult with Taki Izuno)

Item (3) FSR Women projects for improved poultry husbandry and pest control.

Action:

1. Increase collaboration in the FSR women projects at Fatehjang, Karachi, Mansehra and other USAID supported women projects. (Ms. Bushra and Mr. Azim to follow up)

2. Implement the Action Plan prepared jointly by PRI and NARC for a formal MART training workshop.

Item (4) Improving FSR System Performance:

Action:

1. The FSR Coordination Cell members are requested to monitor follow up action in all FSR Project plans and implementation as articulated in this report. (Reference: Project Monitoring report prepared by Van der Veen).

2. National FSR Coordinator will assist each Province conduct training based on recently prepared FSR manuals i.e. "Design and Analysis of On-farm Trials" (Peterson), "Handbook for Data Collection and Budgeting" (Vander Veen) and "Planning, Monitoring and On-going Evaluation" (Vander Veen).

Item (5) Development of FSR Technical A/V Modules:

Action:

FSR Coordinator Dr. Mansab and AVC Director Anwar will adhere to a mutually agreed schedule to work with Dr. Jalis to complete fact sheets, scripts and A/V modules. (Resource person: Dr. Hatch).

Item (6) Schedules and Work Plans:

Work plans and schedules for consultants and FSR Coordination Cells have been prepared and are summarized in Annexure IV.

Action:

1. MART consultants and FSR Coordination Cell scientists will monitor progress in the implementation of FSR recommendations articulated in this report.

2. TOR for the next FSR and NARC research consultancy will assess progress in achieving stated goals and defined action.

5. CONCLUSIONS

While the FSR approach is expanding, and small farmer productivity under contrasting systems has significantly increased in all FSR project areas, FSR programs still remain to be institutionalized. A permanent resource base that supports FSR on a sustainable footing has been pursued during this consultancy. Strategies have been articulated for FSR participating institutes and universities in each province to prepare their respective FSR/PCI. Ideally provision should be made in each PCI for a FSR Development budget at least initiallyderived from ARP II funds.

Improved rural family welfare has been documented as a result of impact studies in FSR project areas. In order to accelerate farmer adoption of improved system technology several Pilot to Production Projects have been initiated in partnership with private firms and extension. Most notably, in selected areas of the Punjab's wheat-rice system, the zero-till drill accompanied with other crop and livestock improved technologies are under study. Several hundred cooperating farmers are participating. An accelerated orchard improvement and FSR women poultry improvement programs are also being launched in the provinces. Private firms and extension are cooperating.

The inclusion of FSR in the Agricultural University curricula and FSR training willbe advanced as a result of recent FSR workshops. Jointly developed manuals in On-farm Research System Design/Analysis, Farm Profitability Analysis and improved FSR Project Monitoring have been developed by FSR consultants Petersen and Vander Veen.

An equally important component of this consultancy was to assist reactivate NARC. A precious resource of more than 100 young scientists returning from abroad with Ph.D degrees demands that a swift improvement in the professional scientific environment be carried out. Productive research with reduced budgets will require hard choices in research programs. Reallocation of resources must be made. The report articulates alternative strategies to reactivate NARC. Appointment of a full time DG/NARC with effective deputies, is essential. Focus on one or two research thrusts with defined outputs, upgraded support services and an effective Review/Monitoring Cell constitute other bottom line requirements.

This report identifies items where progress has been made but also defines desired action where opportunities remain to be addressed.

TERMS OF REFERENCE
FSR CONSULTANT
(JULY 9 - SEPTEMBER 6, 1991)

The basic purpose of this consultancy is to assist the provincial FSR Cells and the national FSR Coordinating Cell to review progress thus far, make research plans, allocate the budget, and develop individual skills in FSR methodology. He is also to assist the provinces, including Agricultural Universities, in every way possible to further the institutionalization of FSR.

1. Advance the institutionalization of FSR throughout the NARS including the establishment of provincial FSR coordination Cells and development of Agriculture University FSR curriculum/training.

2. Assess FSR program performance in all the provinces and advise desired remedial action.

3. Develop research-extension conferences and collaborative projects with private firms to accelerate farmer adoption of improved technology.

4. Prepare training, seminar, workshops and develop future technical assistance needs in systems research.

5. This work will require visits to each provincial FSR Cell and close working relationships with all provincial FSR Cells as well as the national Coordinating Cell.

6. The consultant should also review the implementation of the Master Research Plan at NARC and give whatever assistance he can to expedite this process.

RESEARCH THRUST: EXAMPLE ONLY.

IMPROVING SUSTAINED PRODUCTIVITY OF BARANI CROP AND LIVESTOCK SYSTEMS TO OPTIMIZE SOIL AND WATER RESOURCES:

- EACH PROGRAM WOULD BE INTERDISCIPLINARY AND INVOLVE BASIC, APPLIED AND SYSTEM RESEARCH.
- THE NARC MASTER PLAN WOULD SERVE AS A GUIDE TO SELECTED RESEARCH PROJECTS.

Table 1. NARC Research budget (Real Rupees) For years 89/90 through 91/92

(Rs. in Million)[1]

	89-90	90-91	91-92
Total Budget	56.114	46.510	42.760
Budget for NARC	47.951	46.510	43.230
Budget for Scientific Program	30.000	28.340	26.020
Establishment Charges of Scientific Program	21.600	19.170	18.580
Budget for Research operational budget	8.390	9.170	7.450
No. of Scientists BPS-17 & above	212	247	247
Research Budget per Scientist	0.040	0.037	0.030

Table 2. Number of Scientist positions at NARC for years 89/90 to 91/92.

	89-90	90-91	91-92
Sanctioned	936	1063	1063
Filled	861	947	947
Vacant	75	116	116
Research Projects	45	53	54
Support Units	6	6	6

[1] Adjusted for inflation

Table 3. NARC Institute Staff and Research Operational budgets for period 89/90 to 91/92

(Rs. in Million)[1]

	89-90	90-91	91-92	(Operational 1%)[2]
CROP SCIENCES	11.2	8.4	8.4	12
Scientists Salaries	8.2	6.7	6.7	
Operational	2.7	1.5	1.3	
ANIMAL SCIENCES	7.0	7.7	7.7	35
Scientists Salaries	4.6	4.8	4.9	
Operational	2.1	2.4	2.1	
NATURAL RESOURCES	5.2	7.1	7.4	28
Scientists Salaries	3.2	3.9	4.6	
Operational	1.8	2.7	2.1	
SOCIAL SCIENCES	0.5	1.6	1.4	24
Scientists Salaries	0.2	0.9	1.0	
Operational	0.2	0.6	0.3	
FARM MACHINERY INSTITUTE	3.2	2.8	2.8	11
Scientists Salaries	2.5	2.2	2.4	
Operational	0.6	0.4	0.3	
C.D.R.I.	2.3	2.6	2.6	15
Scientists Salaries	1.7	1.9	2.1	
Operational	0.5	0.5	0.3	

[1] Adjusted to 7.5% inflation
[2] Ratio operational to total budget

Table 4. NARC Development Budget for Research
Technical Assistance of Operational Research
1989/90 to 1991/92

(Rs. in Million)

	89-90	90-91	91-92
Total Budget	52.5	108.9	60.8
Technical Assistance	12.6	44.1	14.7
Scientist Salaries	14.6	5.0	3.0
Operational Budget for Research	9.9	4.7	2.5

Table 5. NARC Total Operational Budget for Research
(Development & Non-Development)

(Rs. in Million)

Research Operational	89-90	90-91	91-92
Non-Development	9,075	10,790	9,608
Development	9,913	4,790	2,574
Total Operational	17,564	13,243	9,441

PLAN AND SCHEDULE FOR NARC ACTIVATION AND FSR INSTITUTIONALIZATION

ITEM	1991			First Quarter 1992
	September/October	November	December	
NARC ACTIVATION				
• Appointment DG/NARC -				
• Define Research Thrusts and Linkages				
• Reallocate staff and operation funds				
• Articulate Support Staff Job Descriptions				
• Develop Research Monitoring Cell				
FSR INSTITUTIONALIZATION AND IMPACT				
A. Implement Work Plan 91/92 and Draft PCI				
Punjab				
Sind				
Balochistan				
NWFP				
NARC				
A/V Tech. Modules				
B. Annual FSR Report 1990/91				
Draft/Province Review				
Final Draft/PARC Review				
C. Pilot to Production (Wheat-Rice System)				
Wheat Program/ORP/FSR				
Articulate Work-plan/Targets				
Implement zero tillage etal Technology				
Develop Monitoring/Evaluation				
SHORT-TERM CONSULTANTS				
• Research Systems (Foreign)				
• FSR Special Topics (local)				