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9. ABSTRACT

Reports on a workshop on small livestock production held in Morrilton, Arkansas, June 14-17, 1976. The purpose of the workshop was to bring together an international group with experience in areas of smallholder and pastoral systems in which livestock keeping is important. Research and development work and projects on livestock for small holders have been neglected worldwide. The topics of discussion at this workshop included the role of livestock in the most important smallholder systems; the physical, biological, economic and other limitations on improvement of livestock enterprise for small holders; and methods, research and action programs to improve livestock enterprises and associated feed resources for the small farmers of the world. The following program guidlines are offered: people to be served by projects must be involved in planning and implementation; market development must be a part of project development; adequate feed supplies must be ensured; simple, easy to use packages of workable technologies must be devised; access to capital must be improved; programs should be location-specific; appropriate training at all levels must be devised and applied; more wellplanned pilot programs and more analyses of existing projects are needed; and programs must be supported for an adequate number of years. Assistance for small holders must emphasize labor use, self-help, stability, and land-saving technology. The programs must be economically viable and at a low cost per farmer, and the results must be extended to large numbers for meaningful results. While the workshop had no definition of "small holder," the concern was with those of small acreage, from the near landless man with one cow to those with about five hectares. Also included are those with small herds which range over large areas of public lands.

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seminar report

Improving Ruminant Livestock Production on Small Holdings

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This seminar report is based on a Workshop on Smallholder Livestock Production held at the Winrock Conference Center, Morrilton, Arkansas from June 14-17, 1976.

The workshop was sponsored by The Winrock International Livestock Research and Training Center, and The Agricultural Development Council's Research and Training Network Program. The RTN is funded under a contract with the Agency for International Development.

Single copies of this report are available without charge from the Agricultural Development Council. Copies of materials presented at the workshop are available only from the individual authors.

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The Situation

In most regions of the world, small farmers and pastoralists have opportunities to use livestock to improve incomes through fuller use of their family labor and limited land resources. Livestock, in addition to being an important source of human nutrition, also provide fiber, motive power, fuel and fertilizer. Ruminant livestock—cattle, buffaloes, sheep, goats, camels and a few others—deserve special attention because they can utilize so well grazing lands, by-product feeds and family labor of low opportunity cost. Research and development work and projects on livestock for small holders have been seriously neglected worldwide.

The Purpose

This workshop brought together an international group with experience in areas of smallholder and pastoral systems in which livestock keeping is important. Participants and their discussion initiators:

- Described the role of livestock in the most important smallholder systems.
- Identified the physical, biological, economic and other limitations on improvement of livestock enterprises for smallholders.
- Recommended methods and research and action programs to improve livestock enterprises and associated feed resources for the pastoralists and small farmers of the world.

Conclusions

Human concern for the plight of the world's 100 million small farmers is indeed great. But knowledge on how to improve the situation and commitment to sustained action are limited. Our workshop was in the vanguard of a new thrust for developing programs so that smallholders might make more significant contributions to the food supplies and economic well-being of their countries. We offer the following program guidelines:

- Livestock are a crucial component to improve smallholder agriculture and essential to advancing human nutrition over the next two decades.
- People to be served by projects must be involved in planning and implementation.
- Market development must be a part of project development.
- Adequate feed supplies must be ensured.

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- Much useful technology is already available. But simple, easy-to-use packages of workable technologies must be devised. Major research gaps fall in the realm of socio-cultural constraints and ways of counteracting limits of scale.
- Access to capital must be improved.
- Programs should be location-specific; that is, geared to the problems at the site of action.
- Appropriate training at all levels must be devised and applied to assure program success.
- Communication within projects and among project leaders can be vastly improved.
- Programs must be supported for an adequate number of years.
- More well-planned pilot programs and more analyses of existing projects are needed.
- Smallholder development programs cannot succeed without adequate government commitments and supportive policies.

Significance of Smallholder Ruminant Agriculture

Smallholders

Most of the world's poor still live in rural areas. In the developing countries alone there are over 100 million farms of less than 5 hectares with about 700 million people—18 percent of the world total. Half of these 100 million farm families have less than 1 hectare of land. Some have no farm land at all.

Many low-income smallholders have livestock. Substantial proportions of ruminant livestock are on holdings of less than 5 hectares as shown below for a few countries where smallholders are especially important.

	Proportion of All Animals that are on Farms of Less than 5 Hectares		
Country	*Cattle*	*Sheep*	*Goats*
Korea, Republic of	96%	72%	97%
Czechoslovakia	11	32	98
Portugal	48	m	46
Surinam	55	56	68
Iraq	45	28	38
Lesotho	82	81	87

The workshop established no arbitrary definition of smallholder. Our concern was with those of small acreage, from the near landless man with one cow to those with about 5 hectares. But for some regions "smallholder" includes farms that are somewhat larger, but small in relation to others; say, in the bottom decile of producers. We also included those pastoralists whose small herds range over large areas of public lands. In addition to small owner- or tenant-operators, we considered communal graziers whose individual shares are small although the aggregate herd may be large.

The Rationale for Smallholder Programs

Development programs have to be concerned with smallholders because of their great numbers, their poverty, the futility of trying to move them out of agriculture, the substantial resources controlled by them, the enormous amount of underused manpower in their families, and their food production potential.

But the goals, and the resources attributes of smallholders, are not those of fully commercialized agriculture. The goals of the commercial farm are to maximize profits by acquiring and combining production resources in the most economically efficient ways. The goals of the smallholder are to maximize security, satisfaction and money return, mainly by making the best use he can of his principal resource—family labor.

Development policies differ for those kinds of farms. For the commercial farm little external assistance may be needed except for infrastructure and price and resource policies supportive of the market place. The farmers can do the rest. For smallholders, public assistance should seek to counteract the diseconomies of small scale, and emphasize labor use, off-farm employment, self-help, stability, and land-saving technology. Programs should respect and capitalize on the folkways.

Commercial farm programs may be expensive per farmer and make a good showing by reaching relatively few farmers. But smallholder programs must meet these tests: (1) Economic viability. There is no point in offering help that will improve the condition of the smallholder a little in the short-run, but hopelessly "box him in" later on. (b) Low cost per farmer. Only modest quantitative increases can be expected from each. (c) Replicability. Results must be extended to large numbers for meaningful results. Modest increases on millions of farms can make a difference.

There is growing concern that the programs of governments, foundations, international centers and the U.N. do not reach small farmers. Industrialization in most countries will not reduce their numbers within the lifetimes of those now working. Betterment of their status will depend on agriculture. Within the universe of small farmers is a constellation of small livestock producers. The A/D/C, out of its concern with smallholders, and WILRTC, out of its concern with ruminant animals, joined hands to convene a group of authorities to see what might be done to increase food production by smallholder livestock producers and thereby improve their well being and add to the world food supply.

Smallholder Livestock Systems

Smallholder livestock production systems throughout the world may be broadly classified in four major

categories: (1) systems in areas with limited arable crop farming, (2) systems in areas of high cash crop and livestock-forage competition, (3) systems in tree crop or perennial crop areas, and (4) systems oriented to labor supplies and market. The characteristics of these systems are broadly determined by climates, land types and economic patterns of the areas in which they are found.

Limited Arable Crop Areas

Systems in these areas are of two types: migratory herding and non-migratory or sedentary herding systems. They are found in all climatic zones where there is limited scope for tilled crops or for intensive pasture management. In general, the areas may be arid, semi-arid, too wet or too steep. Important areas included the Sudan and Sahel savannahs of Africa; a wide range of savannahs in Latin America; the plains in northeastern Thailand; the arid zones of Australia; the U.S. and the Middle East; hilly regions of southeastern U.S.; and mountainous areas as in Nepal, the Philippines, Switzerland and elsewhere.

A migratory herding system is one in which either animals alone or both animals and herdsmen move about in search of grazing and water. Its scope can vary both in distance traveled and number of months in transit. Livestock owners usually do not own the land, but have access to public grazing lands. Livestock graze on stubbles and fallows under intricate agreements with crop farmers.

Non-migratory systems of smallholders tend to be located in regions that have: (a) soil of low fertility that has limited potential for crop production, (b) fertile soil which is not yet utilized for crop production because of insufficient inputs for production, high production risk factors or lack of adequate markets, or (c) steep slopes unsuitable for cultivation.

High Cash Crop Areas

These areas are usually humid or subhumid, temperate or tropical, or irrigated. Kinds of enterprises are widely varied, including milking cattle and goats, bullocks and oxen for work, feedlots, contract grazing of crop residues and others. Common constraints are disease and parasite problems or limited markets. Where there are good markets for crops and livestock, there is high competition and complementarity between crops and livestock and between forage, pasture and cultivated crop production. Crop by-products and residues are important feed sources.

In areas of heavy population pressure, most of the good land is in food or cash crops, and livestock, except as a source of power, become a residual claimant on land.

Perennial Crop Areas

Livestock producers in predominantly tree-crop or perennial crop areas have only limited opportunity to include feed grains and rotation forage crops in their systems. Instead, they must rely on either grazed or harvested forage grown under trees such as coconuts, oil palms, nut crops, rubber, coffee, fruit and cacao.

Livestock enterprises mainly consist of poultry, pigs, goats and some cattle. The special constraints to improved production are possible damage to trees and lack of sufficient expertise. There are some unexploited opportunities to utilize crop residues. Sugarcane tops, for example, have feed value, particularly for beef cattle.

Labor- and Market-Oriented Systems

There are many opportunities to expand and improve labor-intensive livestock systems in developing and developed countries in areas where there is cheap labor and a good market. Actually, from a socio-economic viewpoint, this approach may be better than a capital-intensive system. Examples of labor- and market-oriented livestock systems include small feedlots—frequently pigs but sometimes cattle—to supply local markets; drylot dairies as in Bangalore, India; small herds of dairy cattle as in Taiwan; specialized broiler and laying flocks; and family herds of chickens, ducks, rabbits, goats, sheep and cattle.

Development Requirements and Strategies

Many factors frustrate the efforts of smallholder livestock producers in developing countries to move up the economic ladder from subsistence farming to a more progressive agriculture. Despite these frustrations, there is a potential for increasing their productivity. Strategies to achieve such a goal now appear to be within our grasp and they could become operational in varying degrees, depending upon the quality of the inputs and the natural risks inherent in changes imposed on any socio-economic system.

Management of Animal and Feed Resources

In most developing countries, animal and feed resources of small farmers are closely integrated not only with each other but also with the whole pattern of the cropping system. Ruminant livestock play a combination of roles, as sources of food, fiber, motive power, fertilizer and fuel. Any efforts to improve the productivity of livestock involve tinkering with this complex system, thereby introducing the risk of undesirable repercussions. For example, where crop stubble provides a major source of diet for draft animals, the practice of stubble burning—sometimes required for double or triple cropping—would be detrimental to the system.

Genotype- environment interactions must always be considered in any program to upgrade the milk- and meat-producing ability of cattle. Quite often, the introduction of superior cattle to conditions of poor diet and high parasitic infestations is more likely to

result in higher morbidity and mortality rather than higher productivity. In an A. I. program in Kenya 35 percent of the progeny were dead before breeding age, a $6 million loss.

If, however, the environment can be improved—as it has been in some new dairy enterprises—then herds of improved dairy cattle can be maintained at a high level of productivity in extremely hot, arid areas. To do this requires excellent housing and feeding high quality fodder often produced on irrigated land. The capital and technology to do this are rarely available to small farmers unless they are involved in some type of cooperative enterprise. Actually, if smallholders are to maintain a competitive advantage in many developing countries, the real problem is the coordination of many small-scale producers with large markets and sources of inputs.

An essential stage in improving livestock productivity is to improve crop and forage production so that greater quantities of either land or crop residues are available for the livestock. More emphasis must be given to tropical pastures and particularly to incorporating quick-growing legumes into existing farming systems.

In the many past efforts to improve smallholder livestock production, the application and adaptation of technology have been neglected and socio-economic considerations have been largely ignored. It helps, therefore, to know in great detail just how livestock fit into the economy. For example, in India, where milk provides almost the sole source of animal protein in a country where protein intakes are very low, the tool for initiating successful development has been a strong market organization which provides the incentive for small farmers to produce milk as a major commodity.

Two prime factors in developing improved smallholder livestock enterprises are an increased feed supply and better animals. To provide greater feed supplies, one has to enter a highly complex system which is successful only when adequate incentives, credit and technical information are provided. Increased availability of feed and credit will only bid up the price of animals if livestock supply is not simultaneously increased. The ultimate incentive is greater income which can result from either good market outlets for livestock products sold on a regular basis, or increased crop production which produces more products and residues for animal feeding.

Capital and Credit

Inherent in any program to develop more productive livestock systems for smallholders is a workable credit system, particularly when operators have little or no capital. Unfortunately, institutions in rural areas are not geared to meet the needs of small farmers, and commercial institutions are reluctant to make loans because administrative costs of small loans are high. As a result, in many countries, 70 to 80 percent of small farmers do not have access to institutional credit.

One of the deterrents to wider use of credit is the high interest rates that many small farmers are forced to pay. Rates charged by commercial institutions range from 24 to 200 percent. Although institutional rates are lower—6 to 16 percent—such loans are not often available to those producers who need them most. Those operators who are fortunate enough to obtain loans generally try conscientiously to repay them; yet the number of loan delinquencies is often very high.

From the standpoint of the small producer, the factors that affect the amount of credit a lending institution can deliver are: (a) an available technology that can be applied and used properly, (b) the number or degree of inputs supplied by the farmer, (c) a desire by the farmer to personally invest borrowed money and to pay for the service, and (d) a guarantee or understanding of repayment schedules.

The main questions or issues that need to be considered in developing better credit programs for smallholders are:

- Local government should take a larger role in credit development and take steps to avoid political interference and corruption.
- Interest rates should be kept as low as possible without being subsidized. Group credit schemes can help reduce costs. World Bank experience with subsidized credit has been that larger farmers get most of the credit, and private and cooperative credit agencies are driven out of the market.
- Farmers must be helped in drawing up repayment plans in line with pricing policies and expected income.
- New loan eligibility criteria need to be developed—perhaps not based entirely on security.
- Private banks need to be encouraged to get into the picture.
- Credit institutions must become more than source of credit; that is, the human factors and more complicated new technology must be recognized and dealt with. Credit can be an important part of a package of inputs.

Research and Development

The term *research* as used in relation to the development needs of the smallholder invariably should embrace a trilogy approach: the adaptation of available technology, the generation of new technology, and the application of technology.

Before any program is conceived and developed, researchers must understand the production continuum. There is no substitute for getting an understanding of the production system at the field level. A

researcher cannot appreciate the biological, physical and social aspects without a survey of the problem at its site.

In many instances, we already possess the know-how to effect significant improvements in productivity. Some livestock operators have achieved a dramatic increase in production by using presently available knowledge and applying it to existing herds and equipment.

Four criteria should be considered in setting up and activating any new research project:

1. The research should be problem-oriented to a real-life situation.
2. Resolving a constraint, or problem, must result in significant improvement in productivity.
3. There must be a reasonable probability of success.
4. The research problem must fall within the research capabilities of the institution handling it.

The two main constraints facing smallholder livestock producers, especially, in tropical regions, are (a) inadequate feed supplies and pastures and (b) poor, or limited, exploitation of the possibilities in mixed crop-livestock operations. Constraints such as poor animal health and lack of good germ plasm for adaptation to tropical regions involve technology application rather than research. A third set of constraints affects program development—the knowledge gap concerning appropriate input delivery systems, markets and administration and the values and motivation of smallholders.

The action point of research is at national institutions in the countries where the problems exist; moreover, this research should be problem-oriented, not discipline-oriented, and concentrated on the problems of smallholders who operate on a mixed enterprise basis. Much research could be based on field testing and demonstration on private farms as is done at the Instituto de Ciencia y Technologia Agricolas in Guatemala. International centers of research complement or reinforce the role of national institutions. To be most effective, therefore, such centers must generate technology that will have broad application. This process can be reinforced at institutions in developed countries by in-depth interdisciplinary research on production constraints that are not location-specific.

Technical Services

The subject of technical assistance is much more than perceiving the need for certain experts in projects. It is the whole institutional framework within which the experts are expected to work. Listening to the people and training at the local level within the country are most important.

The most serious problems in rendering technical services to developing countries are those relating to management. Most rural development projects are now being enacted through existing government agencies of the country receiving the service. The technical services provided by credit supervisors, extension agents and vendors of farm supplies often are inadequate.

A study of the World Bank of smallholder livestock development in Kenya has been cited as an instance in which development workers gained an understanding of the elements of strategy that have led to successful development of two types of smallholders —crop-dairy farmers and the group ranch scheme.

Findings of the Kenya study—together with those of other field case studies—suggest several implications for the design of smallholder technical services strategy. Techniques should be devised to assess how well the smallholder, his local organization and his government may respond to development efforts. Subsidies may be needed to provide a market system that fulfills the needs of smallholders. Subsidies may likewise provide social payoffs in programs of training for rural inhabitants and technicians at the local level.

Useful technical services may also be well justified in helping local cooperative organizations get started, particularly those in which individual members become involved and feel needed.

Data from the World Bank records indicate the scope of one institution's activity in providing technical services and assistance to the rural poor of the world. In 1975, 2.7 million families directly benefitted from World Bank lending. About 80 percent of these families were in the poverty group.

Input and Output Markets

An examination of the livestock marketing system through which smallholders in developing countries must market their products shows that the functions and facilities do not always operate normally or to the mutual advantage of both marketing sectors.

In many production areas, West Africa for example, transmission of market information is slow and inadequate because of the vast areas involved, the fact that producers are widely scattered and that communication facilities are poor. As a result, producers are often exploited.

Exploitation of livestock producers in any area usually occurs because they are remote from population centers and because there is inadequate concentration of products. These conditions lead to the fact that only one trader services a given supply area. Thus, remoteness and lack of information may prevent producers from having an up-to-date and accurate picture of the market situation.

The West African situation serves as a good example of the general problems facing smallholder pastoralists in other developing countries. One-half million head of cattle move annually overland for a

distance of 500 to 900 miles to market—an operation that can take from 2 to 4 months to accomplish. Most of these animals are walked down from the Sahel to the coast, and most of the market information is relayed by informal networks. Producers do not need information on daily fluctuations, but rather on longer term outlook. The fact that the market system functions at all is undoubtedly a testament to human ability to respond to economic incentives. One indication of how well it functions is that 55 to 85 percent of the retail price goes to the producer.

In general, governments do not recognize the problems of smallholders in developing countries. In those cases where government policies are favorable toward smallholder production, such as Taiwan, information and infrastructure systems are well developed, there is a high degree of farmer participation in local program administration, and markets are well stablized.

Development of Human Resources

Development of human resources in the context of this conference is basically an educational process involving both smallholders and their advisers. Yet it can be viewed as an integral part of a broad strategy to introduce technological change into smallholder agriculture, particularly among livestock producers. Essentially, the education of a traditional pastoralist consists of demonstrating the visible advantages of changes that are basic to survival. Outside workers and training specialists must first win the confidence of a whole community before any thought can be given to introducing radical changes.

Training specialists and extension workers encounter their greatest difficulty in bringing about technological change among farmers who own only a few head of livestock. It is sometimes possible to improve extension effectiveness by working with groups of farmers and by getting the more progressive ones to share their information.

One of the most important changes now taking place in training and educating livestock advisers for work in developing countries is to place the focus on the transfer of technology and how to get farmers to employ technological change. In the past, emphasis was on equipping students to become scientists or technicians.

Education for work in the developing countries should emphasize the process of getting students to think through the special production problems of their own country. They should be encouraged to selectively adapt advanced technology. There is too much indoctrination with a mass of technological facts as applied to production systems in the developed countries. Practical farm experience should be a part of virtually all agricultural training.

Improvements in the agriculture of developing countries may result from efforts to strengthen national institutions. One popular method has been to send teams of experts to a developing country to assist in institutional building. But we don't really know enough about institution building and usually not enough time and resources are allotted to projects to allow them to become viable. A classical example of an alternate approach is that of a "twinning" arrangement set up in India, in which assistance was given to India to set up a number of agricultural universities patterned after land-grant universities in the United States. The 10 year Cornell University-University of the Philippines association is another example. A number of other AID programs have been on a twinning basis. Viable undergraduate programs have been established through a fair number of these twinning arrangements. Only the surface has been scratched, however, in this area of developing human resources by building national capabilities through properly devised programs of research, education and training. Twinning has also been done on a project basis, as with the programs to extend the Kaira dairy model elsewhere in India and into Bangladesh.

Policies and Institutional Development

The process of economic development involves increased utilization of capital, which in turn provides leverage to human effort to increase productivity. Economic development further requires (a) a shift to a market economy away from a subsistence economy, (b) new technology to apply the tools of science, and (c) the application of a business-oriented management. From the standpoint of the smallholder livestock operator, the process becomes one of finding a way to fit him into the above-defined framework.

But there are constraints to achieving such a goal. One of the chief ones is scarcity of capital. Second, adequate management capabilities necessary to foster a modern viable economy are not provided in the training program nor are they respected in the socio-economic system. Third, technicians able to operate effectively within the system are scarce. Fourth, there is a lack of administrative skills within the target group. Fifth, government agencies don't see the broad picture because they are discipline- or commodity-oriented.

Although the growth record of developing countries has been good, smallholders have not participated very much because, first, they feel they cannot assume the attendant risks, and second, governments of many developing countries neglect smallholders. Nevertheless, there are a number of opportunities to increase agricultural smallholder productivity. Suggested ways to achieve success in this endeavor are as follows:

1. Increase production credit to the smallholder in ways that are consistent with cultural heritages.

2. Develop a package approach—inputs, credit, markets.
3. Develop coordinated plans and programs.
4. Integrate local interests, industry, etc., in the plan.

Finally, production increases are not enough. Smallholders need incentives to improve their quality of life. The Kaira milk scheme has very cleverly used profits at union and local levels to improve health and community facilities.

Planning and Coordination

Few countries have really good long-range workable development plans—let alone agricultural development plans; the lack of planning for livestock production is even worse.

At the moment, planning is really a collection of projects, except for a few such as the FAO-sponsored International Scheme for the Coordination of Dairy Development and the International Meat Development Scheme. In the past, those projects were evaluated and given priority on the basis of production and not people. Furthermore, the awarding of priority to those plans was haphazard.

The professed goals of development planning are frequently not the real goals. In some regions where governments say they give priority to the rural poverty problem, per capita rural income (about $20 per year) has changed little over the past decade and during the same period, urban income was 10 times that of rural income.

Effective planning requires a thorough study of the production process in its own environment. Undoubtedly, more time will be needed to study situations and work with people to determine their needs, and then put these needs into a framework within which developers can operate.

There are many ways in which coordination in developing countries may be improved. But the real key to the situation is not by finding ways to change the national organization so that a coordinated system of inputs, extension and marketing can be delivered to the project area. The best solution to the "tunnel vision" of discipline-oriented ministries is to push coordination at the field level.

Recommendations

1. People to be served by projects must be involved in the planning.
   Problem: a. Smallholders vary much in background, goals, capacities, resources and constraints.
   b. Programs are in jeopardy without the input of local leadership in the conceptualizing and planning stage.
   Approach: a. Build around the expressed felt needs of small producers.
   b. Encourage producers to present their problems to development and training agencies for joint study and evaluation by the agency and the producer leadership.
   c. Work out a plan to include all essential elements in the production and marketing.
   d. Follow up with programs of training, design of simple facilities and management.
2. Market development must be a part of project development.
   Problem: a. Markets for high volume and quality exist mostly around cities.
   b. Government policy often discourages livestock production.
   c. Small producers are highly vulnerable to price risk.
   d. Expensive processing facilities are needed for livestock products (slaughterhouses, milk-processing plants).
   e. Factor markets are poorly developed for smallholders (feeds, veterinary services, A.I.).
   Approach: a. Take advantage of high income elasticities of demand for livestock products to develop urban markets.
   b. Give attention to product quality and product diversification to tap high-profit margin sectors.
   c. Spread the costs of indivisible factors, e.g., milk-processing plants, by use of cooperatives or government agencies.
   d. Develop cooperatives or other groups to reduce costs of collection, hauling, and the delivery system for inputs.
   The Kaira Cooperative contract-hauling scheme is an example (India).
3. Provide adequate feeds at reasonable cost.
   Problem: a. Livestock smallholders almost everywhere are short of feed because of small acreage, poor quality land, or the need to buy feeds.
   b. Improved livestock require more feed, or feed of better quality, as with crossbred cows compared with natives.
   c. Ruminant animals have to compete with cash crops for use of land.
   d. It is usually necessary to develop

feed resources along with livestock production.

Approach: a. Build feed production programs into proposed livestock production systems.

b. Develop synergistic crop/forage production systems, e.g., Taiwan.

c. Utilize crop byproducts as feeds, but don't overestimate the supply. As livestock expands, these feeds will become more scarce and expensive.

d. Make a complete study of the feeding, commercial and social rationales for nomadism before making any plans for settlement of pastoralists.

4. Devise simple, easy-to-use packages of technology adapted to smallholder needs.

Problem: a. Much technology is available, but it has not been adequately adapted to needs of smallholders.

b. Smallholder livestock systems involve poorly understood complexes of physical, engineering, economic and social factors. But most research is discipline- or commodity-oriented. Farming systems research is lagging.

c. Smallholders need help in coping with the problems of economies of scale.

d. Programs must be systems-oriented. "Unifactor tinkering won't do."

Approach: a. Conduct research on appropriate technology on production, transport and processing.

b. Conduct socio-economic research on means of externalizing high cost indivisible factors. The Kaira scheme shifted milk processing costs from farmers by establishing a milk union and externalized transport costs by contracting with truckers.

c. Increase in-depth socio-cultural research in advance of the accompanying projects. The Malian Office of Livestock and Meats requires such studies in Mali.

d. Increase development and pilot testing of packages of practices, with adequate documentation to guide replication.

e. Develop field programs where researchers can identify problems and test out ideas for solution. The UNDP-supported Sahelian Center in Mali suggests the usefulness of such centers. Field test demonstrations can often be done on private farms.

5. Make programs location-specific.

Problem: a. No general solutions apply because of variations in local markets, feed resources, ecological factors, family labor, personal goals and traditions.

Approach: a. Examine case studies to see what results can be generalized and which are location-specific.

b. Get managers/evaluators of projects to give their judgments as to essential requirements if project is to be replicated. For example, the National Dairy Development Corporation in India feels that a scheme similar to Amul Dairy should not be attempted unless there is already production of 10,000 to 20,000 liters of milk per day and authority for the agency to control the milk market including imports.

c. Replicate projects on a modest scale.

6. Improve the access of smallholders to capital.

Problem: a. Smallholders need financial help to adopt improved technology. With crossbreeding, for example, the added costs of artificial insemination and better care of the cow and calf must be carried for about three years before realizing any increased returns.

b. Loans to smallholders are expensive to disburse and service.

c. Loan experience is often disappointing if not accompanied by costly technical help.

Approach: a. Reduce credit needs by building capital-saving features into projects. The Kaira Scheme pays farmers twice daily for milk. In Mali, it is reported that young graziers start out with goats and shift to cattle as their finances improve. Some pastoral groups have arrangements for lending animals to those who are starting out or whose herds have been decimated.

b. Lending and training should go hand in hand. "A man should learn before he goes in debt to buy animals."

c. Give technical support to lenders. In Mexico, the FONDO (Fondo de Guarantia y Fomento para la Agricultura, Ganaderia y Avicultura) provides technical backstopping for commercial bank loans to small farmers.

d. Experiment with and build on group credit schemes. "With smallholders, a 1 to 1 credit relationship is too expensive."

7. Provide appropriate training at all levels.
   Problem: a. Training suitable for smallholders is presently unsatisfactory at all levels. University training lacks smallholder orientation and exposure to farm conditions. Focus is on disciplines and not on production systems.
   b. Some ecological areas with a potential to expand livestock production presently have few skilled livestock producers and special training is needed. Important examples are some tree crop areas (e.g., coconuts and forest areas) where research shows a potential for grass and livestock.
   Approach: a. Expand farm experience training in university and school of agriculture training.
   b. Encourage interdisciplinary training to cover areas important to smallholder livestock systems.
   c. Provide for in-service training and retraining of project staff at all levels.
   d. Increase attention to management training for executives, supervisors and foremen.
   e. Provide frequent interaction between village-level workers and supervisors. In the Benor project in India the weekly visits were a key element in project success.
   f. Improve linkages between farmers and technicians. A key to success in in the Kaira Scheme was that "farmers permitted technical leadership to play a role." In the Winrock/Navajo project, training and participant selection are jointly planned.

8. Improve communication within and among projects.
   Problem: a. Communication becomes more difficult as technology increases.
   b. Within projects, communication among producers, administrators and technologists is inadequate to identify problems, and reveal direction in which project should move.
   c. At the planning level there is inadequate communication among ministries, the private sector and the farmers.
   d. Internationally there is poor communication of programs underway and of results of evaluations.
   Approach: a. Improve communication within and among projects. Improve monitoring and evaluation and use results as a training and communication device to improve the project. Current evaluation efforts in IBRD are moving in this direction.
   b. Share results of project evaluation with other agencies in the country and internationally. Confidentiality is a problem, but evaluating units can remove adverse "ad hominem" aspects while retaining useful lessons to be learned.

9. Programs must be supported for a sufficient number of years to permit them to become established.
   Problem: a. Too many projects are supported for only two or three years and then phased out.
   b. Most livestock programs, especially with smallholders, need long-run technical and management help to build understanding, acceptance and competence, and to change institutions and outlook. The Kaira Scheme was under development for about 15 years.
   Approach: a. A useful concept of project life is one of cooperation for a stated period, extendable for as long as each party feels continued participation is worthwhile in terms of results being achieved. This is the view underlying the Winrock/Navajo project.

10. More pilot-scale development projects are needed.
   Problem: a. Smallholder livestock programs are so location-specific, and so few have been tested, that new systems need to be tried out under a range of conditions.
   b. With livestock programs, field demonstration is more difficult than with crops where one-fourth acre plots on a few farms may tell the story. The unity of test may be a few feedlots or dairies, a market area, or a nomadic zone including summer and winter grazing.
   c. Some of the existing pilot schemes are not adequately documented.
   Approach: a. Identify and catalog existing significant smallholder livestock pilot schemes, recommend and support additional systems and locations for

testing. An international workshop would be worthwhile.

b. Expand the study of successful experiences, such as the Kiara milk scheme, the Kenya Group Ranch Scheme, and the Malawi Stall-feeding Project. In addition, review some of the successful ones.

c. Review monitoring/evaluation procedures and devise more effective ones, including arrangements for communication of findings.

11. Government commitment and support needs to be strengthened.

Problem: a. No development program can succeed if government policies are inimical to it. Minimal elements of support include price policies that make livestock production feasible and some minimum infrastructure.

b. Smallholder livestock programs can be helped if government commitment goes beyond these minima to include land reform if needed, creation of marketing, credit, research and extension institutions, provision for animal health and financial support.

Approach: a. No program of livestock development should be attempted if government policies ensure that it will fail. The condition established by the National Dairy Development Board (India) that dairy schemes would be undertaken only where it had control of the market, including imports, suggests the kind of firmness that planners should insist upon.

b. International development agencies should be responsive to the expressed and demonstrated "will to develop" of governments, local authorities, and producers. The inclination of IBRD to give special attention to countries undertaking meaningful land reform is illustrative.

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