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A PROVINCIAL PLANNING AND IMPLEMENTATION GUIDE FOR THE INTRODUCTION AND MAINTENANCE OF ANIMAL TRACTION*

by

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INTRODUCTION

Programming for Animal Traction (ANTRAC) projects in francophone West Africa has been and continues to be organized on a provincial basis. This is due to the nature of the technology and to the organization of agricultural services. This guide is directed at those provincial organizations charged with the design and implementation of such projects.

An agricultural system based on a technology of hand hoes can be sustained at the village level, whereas ANTRAC technology can not. The nature of the equipment, its supply, its durability and its manufacture prohibit a fully localized management of the technology. The techniques for manufacturing will not lend themselves to a completely independent installation in each village. The supply of work animals also requires organization at least on a provincial level, if not also on a national level; on-farm maintenance of these animals calls upon the services of provincial agencies. These inherent characteristics of ANTRAC technology help dictate a provincial organization of ANTRAC projects.

Many agricultural development activities are already organized on a provincial basis. In many instances in francophone West Africa (Benin, Togo, Upper Volta, Mali), parastatal organizations have been established to coordinate all development activities on a province-by-province basis. This policy facilitates working with international donors and permits an integrated approach to planning and implementation. In this environment, much of the decision making, as well as the logistic services (roads, transport, government agencies and communications) is provincially

oriented. These provincial development agencies have a major responsibility in defining the ANTRAC system, overseeing its implementation and assessing its performance.

OBJECTIVES

This guide is presented in conjunction with two companion texts which are directed at village extension agents and at national governments and donors. This paper presents guidelines for planning a provincially based program to introduce and support ANTRAC. It also outlines organizational considerations for implementing a range of provincial services designed to sustain farmers using animal traction.

PLANNING AN ANTRAC PROJECT

In designing an ANTRAC project, it is important to maintain realistic expectations of farm performance. In the past, programs have been unable to approach the potential benefits of ANTRAC as indicated by experiment station work. In the planning process it is wiser to consistently use conservative estimates of potential benefits. This section discusses the nature of interpretation necessary to the planning process and suggests guidelines to be used in specifying the farm level technical package and the terms of credit and insurance.

Information Needs

To initiate the planning process, the regional agency will require technical and socio-economic information on actual farm conditions, alternative ANTRAC packages, costs and returns of those packages and implications for farm organization. The agency will need indications of land use patterns, animal ownership and cropping mixes, as well as cost/benefit analysis of farms with and without ANTRAC.

In the costs and returns exercises, careful attention should be given to assessing costs at their real prices and to conservatively estimating potential benefits. It is misleading and presumptuous to imply that the performance on a highly controlled test plot can be duplicated by farmers. If farmers can pay the real costs of a technology, it is far more likely that the national economy and the regional agency can sustain and support that technology.

This information base will permit the regional agency to identify the cornerstone of an ANTRAC project: the farm level technical package. A rational program for farm organization will determine in large part the services and activities the agency will have to perform to sustain ANTRAC technology.

Farm Level Technical Package

The choice of power source and cropping operations will in large part determine the equipment package to be made available to farmers. The technical cropping operations will be determined using agro-climatic constraints, concern for soil improvements, animal maintenance and farm level economics. The traction requirements will be determined by this choice of cropping techniques. Using information on the ownership patterns of large animals and the provincial and national level capacity to supply those animals, the animal(s) to be used for traction can be identified. This decision should reflect not only those species locally available but also the distribution of ownership. The extent to which farmers can commit their own animals to the program significantly reduces the credit burden, represents a significant commitment to the program and can be seen as a downpayment to the loan.

The traction potential of an animal will also have to be weighed in conjunction with a meat production activity. It could be, for example, that in some cases where, agronomically, minimum tillage techniques are preferable and the availability of cattle is very restricted, donkey traction is the proper package. However, it should be remembered that the project is foregoing any productive activity in meat production.

In light of the package's cost, the credit system available and the feasible cropping systems, the regional agency can then identify criteria for farm organization that can meet repayment requirements as well as address the agro-economic constraints. Guidelines to farm organizational structure will have to respond to five basic concerns:

1. With reasonable levels of expected benefits, the proposed farm package should meet the terms of credit repayment. Again, the results of experiment station work should not be used directly to forecast benefit streams on actual farms.
2. The proposed farming system should encourage and facilitate the sedentarization of land use and incorporate a progressive plan for soil improvement. Although the individual farmer may not perceive tangible benefits to these investments, a long range perspective leaves no doubt of the importance to agriculture of these issues.
3. With ANTRAC technology dependent on the use of working animals, the package should explicitly incorporate the on-farm maintenance of these animals. Particular concern should be focused on the package for dry season feeding.
4. The farm enterprise should be organized with careful consideration for the availability of labor and its allocation to the

to the various production activities, as well as across the agricultural calendar. The promotion of plowing and/or ridging can, in fact, aggravate what is already a serious labor bottleneck--weeding.

5. The farm prototypes should obviously account for the food and cash needs of the family. This will be the primary incentive to individuals for the adoption of ANTRAC. Without a strong potential for personal benefit, the adoption of this technical package will have little justification to the farmer.

The Credit System

The technical package and farm prototypes are inextricably linked to the credit system. In light of what is technically feasible and economically productive, the terms of credit should be laid out by the provincial agency. The end result should indicate that with reasonable (not ideal) expectations for performance, farms should be able to meet the terms of credit. In designing a credit system for ANTRAC, there are essentially seven issues to be considered: 1) preconditions for credit, 2) purpose for credit, 3) downpayments, 4) level of interest rates, 5) annual payments, 6) insurance and 7) default and foreclosure.

Preconditions for Credit

In order to have access to a line of credit, a range of preconditions can be expected of the farmer. While it is difficult to expect small-holder farmers to provide collateral, per se, for loans, adherence to a set of preconditions can be a partial substitute for collateral.

Specific preconditions have to be defined on a project basis. The project might ask for a minimum area planted in a cash crop, and these

need not necessarily be defined as export crops. For example, the recent Sahelian drought clearly demonstrated the importance of food crops as cash earners. A precondition calling for a minimum area of a particular crop or crops should reflect comparative prices and potential cash earning such that the farmer can be expected to meet the terms of credit. The farmer could be required to provide shelter for his animals and equipment. The extension system may insist on a plan of work for the farm's operations. Such preconditions are used to demonstrate a farmer's commitment to a loan. They require investments by the farmer that are within his capacity and yet demonstrate his willingness to meet the terms of credit. The preconditions also serve to facilitate the adoption of an integrated set of innovations by establishing the potential for an interrelated set of practices. Requiring a stable as a precondition for the loan will facilitate manure collection and composting. A given cropping system can contribute to soil improvement and the sedentarization of land use.

Purpose for Credit

The regional agency also determines for what purpose credit will be made available. The purpose of credit is to make inputs available to those who cannot afford the cash purchases. No doubt some rural smallholders can pay cash; and some incentives should be incorporated to ensure that those who can, pay cash. However, the intent is to reach the middle 60 to 70 percent of the farming population with the new technology and they will need credit for equipment and animals. Across francophone West Africa, a ballpark figure for the real costs of a fully

outfitted oxen-powered animal traction unit would be about 200,000 CFA ($900 U.S.). Such an investment is out of reach for most small-holder farmers.

Depending on ownership patterns of large animals, it may be undesirable to provide credit for animals. Using their own animals serves as a substantial commitment to the technology and can be interpreted as a downpayment on the package. If credit is available, pressure should still be applied to bring out farmers' own animals. As a common technique for storing savings, animals put to work and kept on the farm will appreciate in value and hence the farmer is earning a return on his savings over and above inflation.

In all situations credit will be made available for equipment. The only source of equipment will be through the provincial agency and hence credit can be made in kind rather than in cash. The automatic purchase of the full line of tools should be avoided. Each farm should be able to choose its equipment package as a function of its farm plan. In outlining which techniques will be used to perform the crop operations, the farmer and extension agent will arrive at the necessary tools. Questions to be answered would include: Is deep plowing necessary for cereal crops? Can weeding be done with peanut lifter blades or is the cultivator necessary? Will crops be grown on the flat or on ridges? How much would a cart be used?

Downpayments

Depending on the purpose and level of available credit, it may be preferable to call for a downpayment. If the farmer is using his own animals, the downpayment should be minimized. It might simply be the cost of the yoke and chains. If the farmer is receiving the animals on

credit as well as the equipment, stiffer preconditions should be applied and a more significant downpayment required--perhaps 5 to 10 percent of the principle. The intention is to convey the seriousness of the loan.

Level of Interest Rates

In past programs, annual interest rates have varied from 0 to 9 percent. It is important that farmers recognize that it costs to borrow. On the other hand, the provincial agency must attempt to maintain a financially viable credit fund, which, at a minimum, covers administrative costs. Farmers will have to receive incentives to perform well and repay the loan quickly. Rebates equal to the interest payments for loans paid back early can do this, if they are substantial enough. An interest rate between 5 and 10 percent would be sufficient to demonstrate both the disincentives to loan default and incentives to early repayment.

The real cost of money in these economies is likely to be close to 20 percent and private lending rates are much higher. With rural-urban pricing ratios usually in favor of the urban consumer, it is probably unrealistic to expect farmers to pay the real interest rates. Furthermore, given the current input/output price relationships, it is likely that real interest rates would seriously weaken the feasibility of the package. With official rigidity in output prices, the jump in the interest rate (a cost of production) from 5 to 20 percent becomes a significant increase in the costs of production with no comparative increase in the returns to production. Regional agencies should aim at recovering costs (personal savings deposits generally return 3 to 4 percent) and covering defaults. Here again, closer to 10 percent would be a reasonable rate to use.

Particular attention should be given to making these loans in kind, not in cash. With the parallel private money market being what it is, the attraction to misuse ANTRAC credit funds is too strong. Such misuse can also occur when animals are supplied on credit (particularly cattle). The demand-pull inflation in the West African red meat market will exert pressure on the farmers to liquidate their animals early, even though they may be only partially paid for. Such phenomena has been readily apparent in the Sine-Saloum region of Senegal.

Annual Payments

The basic question is the level at which payments should be fixed and how many there will be. Since the learning process will not be instantaneous, it is unlikely to expect full application of the package in the first years. It may be preferable to design a gradual increase in the level of payments.

The expected life of the package should be reflected in the number of annual payments permitted. The components of the equipment package will have varying life spans with the most durable parts lasting, if maintained, about 10 years. Cattle should be used from age 3 to age 7 or 8. Horses and donkeys, having little or no resale value, can be used longer. Given the learning process inherent in the adoption of a new technology, the size of the loan and the minimum useful time span of the animals (cattle--5 years), it is unreasonable to institutionally design expectations for any less than 5 annual payments. Quicker repayment can be encouraged with incentives such as rebates on interest charges. Furthermore, it is also preferable to have gradually increasing payments beginning with the first harvest rather than permitting a grace

period. Where there is an adequately designed package, some production improvements should be immediately forthcoming and making a payment at the first harvest underscores the seriousness of the loan.

Insurance

Such a major investment by the farmer needs protection from calamities beyond his control. The animals are, by far, the largest cost item and an insurance scheme should be designed to protect the farmer against the loss of an animal.

Preconditions are set for this insurance which might include shelter for animals, regular health care and the provision of dry season supplements in the cropping mix. On the basis of expected mortality rates (and not actual rates), an annual premium can be calculated for inclusion in the cost of the animal health card. It is assumed that mortality rates will be lower for working animals because they will be kept on the farm and will benefit from more timely and regular health care. The animal health cards will be sold annually at the cost of medicines which include the annual vaccination requirements and other preventative interventions necessary on an annual basis (at least three trypannosomiasis treatments and two dewormings).

Protection on the equipment can be provided by establishing acceptable conditions for payment deferral. If the farmer meets the preconditions for the [illegible] and uses animal traction in good faith, he should not be responsible for calamities (i.e., fire, drought) beyond his control. In such cases, annual payments should be deferred at no additional interest cost.

Default and Foreclosure

Once again, an explicit set of conditions for default and foreclosure is necessary to underscore the seriousness of the loan. If the program is reasonably designed and the conditions for the loan are well-publicized, prompt foreclosure should occur if the farmer defaults for no reasonable explanation. Furthermore, if he does not adhere to the preconditions or does not apply the technical package such that his productivity improves, the technical package should be repossessed. In the early years of the program, the provincial agency will have to assume the loss on depreciation. However, with increasing acceptance of animal traction, charges for depreciation should be made.

Personnel Needs and Training

To prepare for project implementation, the provincial agency will have to determine its personnel needs and training. As an integral component of an agricultural production strategy, ANTRAC is a major responsibility of the agricultural and veterinary extension agents. Therefore, training in ANTRAC should be fundamental to their training programs. Loan officers, animal trainers and rural artisans are also needed.

Agricultural Extension Agents

Local extension agents have to be able to encourage the adoption of ANTRAC, assess credit capacity, and provide management counseling, as well as have a practical familiarity with ANTRAC. Equipped with a bicycle, a village extension agent can be expected to work over a 10 km. radius; staffing levels should reflect this.

Training programs should be based on exposing the agent to an integrated farming system based on the use of ANTRAC. He should work with

animals, assemble and disassemble the equipment, learn what the feasible crop mixes and rotations are and learn cooperative organization and management techniques. He will also need to understand the concepts of partial and total farm budgeting to use in his management counseling.

Before such curriculae can be incorporated into the national training institution, the provincial agency will probably have to supply this training. An initial one-month program for all village extension agents complemented by annual refresher courses should be adequate.

Veterinary Agents

Supplementary training for veterinary agents related to ANTRAC should emphasize the administration of animal health cards and insurance. They should also be trained in the methods and organization for the on-farm provision (both for rainy and dry season conditions) of animal feed and supplements. It is assumed that their regular training includes disease prognosis and treatment. They should also be held responsible for animal health and diet education to farmers.

Equipped with a motorbike, he can be expected to work over a 30 km. radius. Spending the same month in training as agricultural extension agents, he can also benefit from practical training in the use of work animals and equipment.

Loan Officers

These agents will be responsible for the administration of the credit system. Emphasis should be placed on the separation of these responsibilities from those of the extension agents, both during training and in the field. Extension agents, agricultural and veterinary, need to establish

relationships with farmers emphasizing credibility and reliability. If they are the same individuals who first provide counseling and then, after harvest, present themselves to collect loan payments, or worse--to close on the loan--then their relationship with those farmers is seriously compromised. Though the extension agents will be concerned with credit as advisors to the farmers, the administration of credit, collection of payments and foreclosures should be the distinct and separate responsibility of the loan officers.

The training program should include practical familiarity with ANTRAC technology and the farming system using ANTRAC. They will need skills in budgeting techniques and credit carrying capacity assessment. These officers will be responsible for communicating the terms of credit to the farmers and should have clear guidelines on the conditions for deferral, default and foreclosure.

Equipped with a motorbike, the agent would find that a 30 km. radius is again a reasonable area of responsibility. These agents could well be agricultural extension agents transferred to agricultural credit administration with an initial one-month training program in credit and subsequent annual refresher courses.

Animal Trainers

These agents will be responsible for the actual training of the animals, teaching the use of the equipment and providing the farmer's initial introduction to equipment and animal maintenance. Their training will take place in centers for a period of three months. They should take a number of unbroken animals and train them well

enough that they can perform all the prescribed activities in the program. Emphasis should be placed on safety and good maintenance practices. These agents will be training the animals and farmers at the village level and hence have an important complementary role to the extension agents in demonstrating proper handling and maintenance practices. Guidelines for payment for animal training can be set down by the regional agency, but actual payment should be handled between the farmer and the trainer.

Artisans

At these same centers, rural artisans should spend perhaps three to six months learning spare part specifications, improved artisanal techniques and pricing guidelines. Credit should be made available to them for improved tools. Such tools are expensive in francophone West Africa and the terms of credit should be well explained.

In estimating how many artisans are needed, reference should be made to the clients and how far they can walk in a day (20 to 30 km.). A 15 km. radius would be an acceptable limit for one artisan's outreach.

Logistical Infrastructures

There are certain logistical functions which are particular to an ANTRAC program and which will be the responsibility of the regional agency. Because the management concerns of such functions are straightforward, these concerns for logistics are often given only slight examination. Breakdowns in these infrastructures are crucial to the expansion of ANTRAC, to the morale of the extension agents and to the credibility of the provincial agency in the farmer's eyes.

A hierarchical network of depots should be established from a provincial equipment warehouse down to the network of trained rural artisans. A mobile unit, based in the provincial warehouse, will be responsible for moving spare parts and raw materials through the system, as well as administering artisan credit and insuring quality control.

The lack of a syringe or needle in West Africa is a common reason why a given veterinary treatment was not administered. Advance planning and adequate cash liquidity should guarantee that such breakdowns in the system do not occur. Furthermore, an aggressive campaign to publicize animal health cards can also contribute to a better liquidity position for the veterinary service.

ANTRAC Associations

These associations can facilitate contact between the provincial agency and farmers. The provincial agency can encourage membership in such associations by providing price incentives on inputs and outputs bought and sold through the association and/or with preferential terms of credit for members.

All aspects of an ANTRAC system can be coordinated more efficiently through such an association. It can provide a forum for discussion, stabilize the availability of spare parts, medicines and equipment, and coordinate the supply and demand for artisanal services. A well-organized and smoothly operating ANTRAC association can relieve the provincial agency of many responsibilities. In return, that association will need to have bargaining power over ANTRAC issues or the members will have no real reason to accept these responsibilities.

It is preferable that these ANTRAC associations acquire legal identity. This would largely be determined between the association and the source(s) of credit. With such status, the association should then be able to borrow in its own name and guarantee loans to its members. Careful attention should be given to determining at what point this legal identity can be obtained. One guideline might be the repayment rates on ANTRAC loans of the members or the ratio of savings on hand to the total loans outstanding. It is through such associations that farmers will potentially acquire representation in the system of decision-making as well as contribute to a progressively more self-sustaining ANTRAC system at the local level.

IMPLEMENTATION OF REGIONAL SERVICES

Once the various components of an animal traction program are designed, the implementation of the program should follow in a fairly straightforward manner. It is not the purpose of this paper to set down guidelines for the general management of a provincial agency's activities. However, there are some considerations particular to animal traction which will necessitate some special organization.

Guidelines for the execution of an animal traction program are implied in its design. In some instances, I have explicitly dealt with implementation concerns as part of the planning process. Perhaps the most critical concern for the provincial agency is the timing of its activities in relation to the agricultural calendar and the needs of farmers. This is no less true of the agency's animal traction program.

The Animals

The provincial agency will be expected to ensure a reliable supply of work animals and veterinary services. While the form of these activities is determined in the design process, cash liquidity and timing are two critical concerns for the implementation of all programs.

The requirements for animals, medicines and veterinary equipment must be determined one year in advance. The time it takes to find appropriate work animals, move them to where they are needed and train them for a rainy season beginning in May means that a provincial agency should know how many animals are needed no later than the previous August. It should also have a large enough credit fund to pre-finance the animals. For example, with a five-year credit program, one-fifth of outstanding loans will come in each year. Also, one-fifth of the animals have to be replaced each year. This means that the credit fund will stagnate, not having adequate liquidity to permit expansion of the use of animal traction.

For veterinary medicines, no supplier will deliver on credit whether the orders are placed in Dakar or Europe. Animal owners will pay the cost of the medicines; however, there are serious time lags in first obtaining the medicines at the provincial capital and distributing them to the districts and then to the village level. With the medicines in hand, the local veterinary agent will administer the drugs and receive the cash. The money then goes back to the district seat and on to the provincial capital. Only when the money is in hand can the agency reorder the medicines.

The importance of the timely availability of medicines is obvious. Francophone West Africa remains infested with a range of endemic animal diseases for which regular prophylaxis is obligatory. In 1977, for example, there was an outbreak of pasteurollosis in northern Benin which killed hundreds of animals. Three months after the epidemic began, the vaccine arrived. The provincial veterinary director reported that if medicine equal to the value of two work oxen had arrived six months earlier, the outbreak would never have occurred.

Given the inherent time lags and the fact that needs for preventive medicines can be readily calculated, the provincial agency should have a veterinary medicine fund three times the annual needs. This will permit early ordering of stocks and timely delivery to the local level. It should be noted that any breakdowns in this provincial service represent significant losses to the agency since the farmer cannot be held responsible for an animal which dies of rinderpest because there was no vaccine or because it arrived too late.

The Equipment

The unavailability of a plow point at the beginning of the rainy season is disastrous for the farmer's whole crop year. For the cost of maybe five dollars, a farmer may have to default on his loan payment. Here again, equipment needs must be determined a year in advance to permit the manufacturer to order raw materials, receive them, build the equipment and distribute it well before the rainy season begins. The success of artisan manufacture of spare parts will be directly linked to their access to raw materials.

As with veterinary medicines, the unavailability of spare parts can be grounds for justified loan deferral and hence a cost to the provincial agency. Throughout francophone West Africa, one of the major obstacles to continued growth of animal traction has been the unreliability of provincial equipment supply services. In 1977, there were approximately one hundred farmers prepared to pay cash for plows in one district alone in northern Benin and many more who would need credit. The provincial agency was able to deliver fourteen before the rainy season. Many more were delivered in August, but by then remained unpurchased.

Credit and Insurance

The administration of credit should remain separate from agricultural extension. The critical link between the provincial agency and the farmer is the village extension agent. His credibility will depend on how he helps the farmer plan and to what extent he improves the farmer's ability to meet the terms of credit. If he is also responsible for imposing these terms of credit, collecting payments and foreclosures, his relationship acquires a very different character.

These responsibilities should be properly placed with a loan officer who assesses credit carrying capacity, enforces the terms of credit and collects payments. He will necessarily consult with his counterparts in the agricultural and veterinary services. Strong public emphasis should be placed on this separation of responsibilities.

Credit records should exist in triplicate with the original for the farmer, one for the loan officer and one for the provincial office. At no time should the extension agent work with the credit records; he may, however, act as a witness for the farmer when payments are

made. The various mechanisms for protecting the farmer's investment (e.g. animal insurance and health cards) and the preconditions for that protection are monitored by the loan officer. If the terms of credit are not adhered to, foreclosure is executed by the loan officer. The sale of health cards is done by the veterinary service, but the loan officer will have to monitor the use of them in order to determine why a given vaccination was not made.

In case of foreclosure, action should be taken promptly and, where possible, the ANTRAC association should be actively involved. The visible and tangible implementation of the terms of credit is perhaps one of the best ways to explain what the terms of credit are and what they mean. This will avoid an observation common to many animal traction programs that "the farmers did not know the loan had to be repaid."

ANTRAC Associations

Many of the timing questions in the delivery of provincial services can be facilitated by a smoothly operating ANTRAC association. The loan officer, the agricultural extension agent and the veterinary agent should all take every opportunity to integrate the association into the animal traction network of services. The ANTRAC association should also be actively encouraged to participate in all disputes and misunderstandings. An aggressive and vocal ANTRAC association can become the only substantial mechanism available to the farmer to protect his interests, appeal what the farmer feels is an unfair decision and lobby for changes in the system or in services which farmers feel are not meeting their needs.

MONITORING AND EVALUATION

A formal structure for monitoring and evaluating animal traction activities is rarely if ever incorporated into the design and implementation of animal traction programs. This results in a lack of understanding of what effects animal traction has on the farming system, what the problems are and how they might be solved. Essentially, what one observes are very rigid, unchanging programs, unable to adapt themselves to changing conditions because they do not know what is actually happening. They operate based on assumptions made in the design process, which are usually never empirically verified.

Regular reporting mechanisms should incorporate the performance of animal traction and those services in support of animal traction. Extension agents should monitor area and production effects. They should note the use of manure, crop by-products, rotation systems and transport capacity. These observations should be regular additions to the extension agent's documents. The veterinary agents should monitor on-farm animal care, the use of feed supplements and adherence to the health care calendar in order to assess whether or not the work animals are better cared for and are putting on weight more effectively. The loan officers should monitor the performance of the credit system; in cases of default, they should be responsible for a detailed description of why the default occurred or why foreclosure was necessary.

A continual monitoring of farm performance and provincial services should be supplemented annually by a more formal evaluation exercise. At the local level, the ANTRAC associations should use an annual meeting format. Provincial representation should participate, but the purpose of the meeting is for the members to voice their problems, concerns and recommendations.

At the provincial level, all information from the monitoring activities should be compiled and a synthesis should be drafted for discussion. All aspects of animal traction organization and implementation should be subject to this evaluation and redesign. Animal insurance premiums based on mortality rates should be regularly recalculated. Veterinary interventions should be reevaluated, particularly if, despite adherence to the treatment calendar, some disease has too high an incidence. Equipment design and specifications should be reassessed in light of observed performance. In northern Benin, the manufacturing agency switched to retreaded tires for carts, arguing by assumption that the cheaper price justified the change. The quality of the retreads was so poor that farmers quickly sought the original tires even though they were twice as expensive. Unfortunately, it took well over two years for this information to reach the manufacturing agency.

If credit repayment rates are alarming, hopefully the case studies prepared by the loan officers will shed light on the reasons. The successful performance of a credit program is directly linked to how well the terms of credit reflect the actual and potential cash flow profiles of the borrowers. Basic budgeting exercises should be updated at each evaluation session using observed area and production effects

and changing input/output price relationships. There is an obvious communications risk in changing the terms of credit too often; hence, the arguments for such changes should be fairly substantial. Constantly changing rules reduce the farmer's ability to predict and thus plan the growth of his farm.

CONCLUSION

This guide has attempted to highlight the issues provincial agencies must examine in the design and implementation of animal traction. Because draft animal technology permeates the entire farming system, the design of such a program must be fully integrated into a total farming system, its various components closely coordinated and its interactions with other improvements in the system (e.g. crop diversification, seed improvement) monitored. This is necessary not only in terms of the use of animal traction and recommended cropping systems or crop by-products and animal feed, but also in terms of the agricultural extension service, the equipment manufacturing agency, the veterinary service and the credit administration. These pervasive interconnections in the system require that the provincial agency perform a thorough coordinating role such that the farmer is confronted with a set of predictable and reliable services.

In the overall administration of animal traction activities, a standardization of procedure and the timely availability of services will have the strongest influence on the adoption and sustained use of animal traction. To as feasible an extent as possible, administration should be transferred to the ANTRAC associations. The degree to which farmers participate in the administration of the program is

directly related to their perceived interest in the technology. One measure of the full integration of a technology is when the administration of that technology becomes self-sustaining.