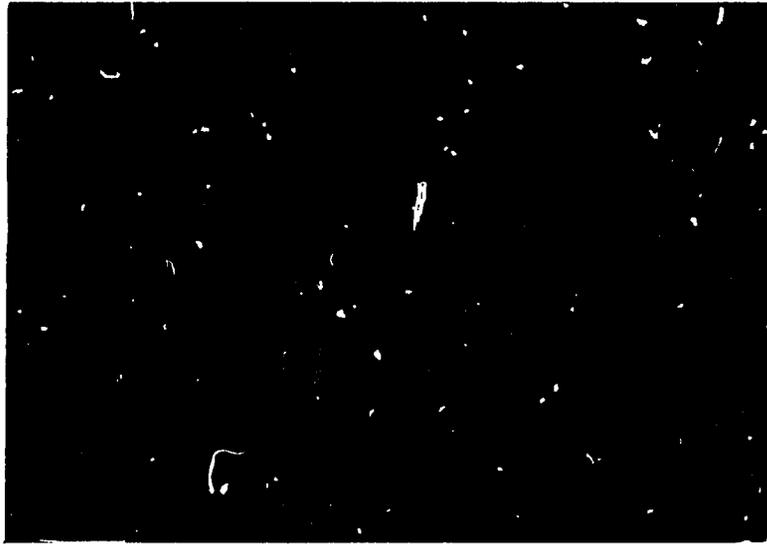


TUFTS UNIVERSITY

# Niger Integrated Livestock Project



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## INTRODUCTION

The Niger Integrated Livestock Production Project (NILP) was designed and approved in 1983, based on data and experience acquired from 1977 to 1982 by its predecessor, the Niger Range and Livestock (NRL) Project. NILP was conceived as a model for the development of the region's herders which placed strong emphasis on organizing local associations as the vehicle for introducing technology, financial services, and education to people whose principal economic activity was extensive livestock production. The Grant Agreement was signed in August 1983, and Tufts University's contract to provide technical assistance, training, commodities, and other services was signed in January 1984. Most of the technical assistance team was in place by April 1984. In addition to semi-annual internal reviews of the project by AID and the Government of Niger, the Regional Inspector General's office in Dakar undertook two missions to the project in May and September 1984. Their final report was issued in February 1985.

In August 1984, it became apparent that the pastoral zone of Niger was being subjected to one of the worst droughts of this century. The project responded by elaborating an emergency program, which was submitted to AID and the GON in early December. This plan, which was approved in February 1985, was designed partially to provide emergency relief and partially to undertake a series of pilot actions that could provide the basis in the future for a pastoral zone drought strategy. The plan, which is currently being implemented, supplements the 1984 and 1985 annual work plans, parts of which have been temporarily set aside because of the emergency situation. A major project goal at present is to integrate drought interventions with those planned for normal years.

This briefing paper elaborates on this chronology of events and presents a common thread that integrates the various components of the project, as these have evolved over the past one and one-half years. It also relates NILP to its predecessor, NRL, and describes how the two projects have generated an approach to development and drought protection in the pastoral zone that is unique in its involvement of local peoples and in its building on existing pastoral systems.

The paper analyzes project attainments in relation to the Project Paper log frame and GON objectives as these have evolved since the Project Paper was written. It examines a number of major issues and offers concrete recommendations for improvements.

## NRL AND A ROLLING DESIGN FOR NILP

The NRL Project was created against a background of very little knowledge of pastoral populations and production systems. The history of livestock projects in the pastoral zone of Africa was not, at the time, one of notable success. Doubts were raised concerning the availability of technical packages for animal production that were economically feasible and socially acceptable. Animal health interventions had achieved some gains but, except for annual vaccination campaigns, depended heavily on a continued infusion of external funds. Attempts at range management under strictly controlled conditions had achieved some results, but serious questions were raised about its applicability in the traditional milieu. Finally, herders in most countries had little, if anything, to say about their development.

The GON and the AID mission designed the NRL project so that it focused on (1) improving the standard of living of small producers, (2) increasing knowledge of existing systems rather than intervening in an ill-informed, heavy-handed way, (3) working with herders in a collaborative context, and (4) developing the zone as a whole instead of concentrating limited interventions in favored or well-known localities. The stated purpose of the project was (1) to prepare a comprehensive and feasible range management and livestock extension plan to optimize annual production and (2) to develop the GON's institutional capacity to carry out recommended interventions under a Phase II project. It was accepted that a thorough understanding of existing systems of livestock production and resource utilization was necessary in order to identify those interventions that were technically, economically, and socially feasible.

### Outputs of the NRL Project

The major outputs of the NRL project can be grouped into five categories.

#### Range Resource Studies and Demonstrations

The NRL project analyzed vegetation/livestock relationships to identify new practices that would increase the total value of livestock production while maintaining or even enhancing the condition of range vegetation. The project undertook (1) an inventory of water points and the groups using them, (2) a survey of the composition and distribution of herds within the zone, (3) an analysis of resource use practices, husbandry techniques, and transhumance decision-making, (4) a land dynamics study of animal/vegetation relationships through intensively observing a single herding unit, (5) systematic aerial surveys of range use patterns within the zone, and (6) grazing trials on fenced pastures.

## Livestock Production Studies and Pilot Interventions

This component was designed to study the effects of a comprehensive technical package on existing production systems and to analyze its economic costs and benefits. Secondary activities were to be limited to budgetary support for existing GON veterinary programs in the zone and construction of facilities for NRL and its follow up. The secondary activities were carried out, but the productivity study was never undertaken.

As it became clear during the project that productivity increases were desirable but difficult to achieve without improvements in animal health, a system for training herders as veterinary auxiliaries was successfully established on a pilot scale. The NRL project also undertook epidemiological and nutrition surveys in the pastoral zone and several other short-term studies related to animal production and health.

## Socioeconomic Studies and Interventions

Socioeconomic research was to focus on herder communities and their organizational structures, decision-making processes, resource utilization, use of government services, and relevant attitudes and aspirations.

Continuing surveys were conducted among samples of Touareg, WoDaaBe, and agropastoral households to gather data on family structure, herd composition, labor utilization, and income and expenditures. A considerable amount of quantitative information was put together dealing with such areas as social organization, herd management practices, and economic activities. Human health and nutrition studies were also undertaken.

Ten pilot herder associations were organized to provide an institutional structure capable of managing interventions designed to increase herding productivity. Priority activities for these associations were (1) training human and veterinary health workers and (2) administering credit programs for the purchase of animals and cereals. No attempt was made to define boundaries within which pastoral groups would have exclusive grazing rights or to place limitations on herder movements. This was a significant departure from earlier livestock projects.

## Livestock Marketing Studies

Two studies related to livestock marketing were carried out under NRL. The first analyzed a large quantity of existing historical data on the prices of livestock, meat, cereals, and principal consumption goods. The second examined Niger's livestock marketing system, assessed the importance of neighboring Nigeria's demand for Nigerien meat, and presented information on the characteristics of, and animal profiles in, a number of major markets. In addition, the socioeconomic studies carried out under NRL and the records of the pilot herder associations provided useful data on sales and purchases of animals by herders.

## Training

This NRL component was oriented towards building the GON's capacity to address the three interrelated areas of range management, animal husbandry, and livestock extension. Ten participants were sent to the United States for degree training and nine members of the Livestock Service staff received short-term training in the U.S. and third countries. In addition, six Nigerien officials at the policy-making level were sent to the U.S. on observation tours of range and land management activities. In-country training consisted of training courses for herder extension agents and on-the-job training of Livestock Service personnel, especially those staffing veterinary posts.

### A Rolling Design for NILP

The NRL Project contributed a great deal to our understanding of pastoralists and their production systems. But there remained substantial gaps, especially the absence of a shelf of field tested animal production and health interventions that were known to be technically, economically, and socially viable. There was also the need for more experience with herder associations and their joining together to form larger organizations at the level of the Pastoral Centers, i.e., major market towns where herders could be contacted during much of the year and in which most infrastructure was to be placed.

Realizing that there was much still to be learned, AID decided to apply the concept of a "rolling design" to the follow-up project. Tufts University was selected as contractor for the initial design using the collaborative assistance approach under the Title XII program, but it was recognized that the design process would continue throughout project implementation as the GON, AID, and Tufts undertook an annual process of evaluating the project and preparing workplans. A Division of Studies and Programming was subsequently established within the project and assigned the task of coordinating and assisting this process. In addition to the annual workplans, the rolling design process could unfold through the signing of Project Implementation Letters and various letters and memoranda of understanding.

### THE UNDERLYING PHILOSOPHY OF NILP

Given relatively poor experience with other pastoral zone projects, it was clear that the NILP design team had to come up with an entirely new approach, and one likely to succeed. It was fortunate, in this respect to have had the NRL Project as a forerunner. Although this new approach, or underlying philosophy of NILP, has undergone some revision over the past two years, the basic outline is essentially the same.

## Herder Organization

From its inception NILP, and NRL before it, has focused on the human element as the driving force within the pastoral system rather than on physical factors of production. Herder organization is based on a "bottom up" principle whereby herder associations are established at the lowest organizational level before they are linked into larger units at the level of the pastoral centers. Emphasis is on maintaining a dialogue between the herders and the project or government services rather than on regulating the herders' way of life.

Herder associations, or Groupements Mutualists Pastoraux (GMP), are based on localized voluntary groups of herders whose bonds of cooperation are enjoined by kin and affinal ties, and by mutual trust and social discipline. These people tend to move together during the transhumance and can be contacted through the market centers that they frequent during much of the dry season.

The herder associations are an important vehicle through which to channel public sector interventions. First, they have a logistical function for the introduction of technical goods and services which enhance production, and, second, they facilitate the introduction of social benefits such as health care. Furthermore, the associations act as conduits for introducing education and cross-sectoral economic linkages that allow pastoral herders to leave pastoralism and exploit alternative economic opportunities in the face of recurrent drought and growing population pressure. This is accomplished by training herders in such areas as health, literacy, bookkeeping, and management. The following examples illustrate this approach.

### Animal Health Delivery

The development of a network of veterinary auxiliaries that receive training and supplies from government services provides to pastoral groups the services of a veterinary technician who moves with them and gives treatments and prophylaxis at the appropriate time without disturbing the pastoral system. Experience to date, especially in East Africa, has demonstrated that veterinary auxiliaries function effectively only if they report to and are paid, if at all, by the local community.

### Water Point Development

Organizations of herders are able to consolidate community opinion and gather the required financial resources to carry out local water point development. This increases their claim to exclusive land use rights and paves the way for small improvements to the rangeland. This process has been observed in other locations in the Sahel.

### Rangeland Improvements

While massive improvements such as nitrogen or phosphate fertilization, reforestation, or irrigated forage production have been shown to be

uneconomical, minor innovations may be possible if the pastoral community is organized to systematically supply the needed labor. Current efforts are directed at small-scale hay making, dry season forage plantations, and hand pitting of encrusted, poorly productive soil. All of these activities can be undertaken by small groups of herders working in collaboration with regular government departmental services.

### Human Health Improvements

Herding is a labor intensive occupation, especially as conducted in the pastoral zone of Niger. It demands full effort every day of the year, from each family member. Herders themselves recognize this and consider access to health care a true priority. GON development policy also stresses the importance of improving health care in all rural sector improvement efforts. Results from NRL studies and trial training of pastoral health auxiliaries have indicated the potential effectiveness of improving health services to pastoral families within the context of herder associations.

### Multidisciplinary Systems Approach

An important concept in the design of NILP is that of a multidisciplinary systems approach to development in the pastoral zone. Changes in one area, such as marketing, for example, can have an important impact on other areas, such as animal production, range management, and human health. The perspectives of animal production, veterinary medicine, range management, sociology, economics, finance, institutional development, marketing, and human health are all necessary if a successful integrated approach to pastoral development is to be undertaken. In addition, it is important to understand the system as a whole. This involves investigating the numerous linkages that exist between different components of the project. A few examples are illustrative.

### Veterinary Epidemiology

Two examples illustrate how the project's approach to animal health is meant to impact positively on the whole system. First is the emphasis on animal health at the herd level. Although this approach, which includes health, management, and production, has gained wide acceptance, its application to pastoral systems is in its infancy. NILP is fortunate to be promoting an organizational structure - the GMP - where family herds are recognized and herd health interventions can be administered. The principals responsible for the program are the veterinary auxiliaries, active herders, and members of the GMP trained by the project. The GMP, in turn, is able to recognize a concrete benefit from the activities of the auxiliaries and is motivated to monitor their services and reward them appropriately. Thus, the herd health program and the organizational activities complement each other.

The second example is the development of a protocol to deliver vitamin A supplementation to grazing animals. Most obviously, this improves productivity during the dry season and increases the subsequent reproductive rate. Just as important is the fact that night blindness can be prevented. This facilitates herd management during the dry season when labor constraints are the worst. Without night blind animals, herders can trek their animals to water at dawn and return at dusk, thereby ensuring adequate time for rest and watering. Vitamin A is also deficient in the human population during the dry season. The project's research is consequently concerned with the passage of the supplemental vitamin A in the animals' milk to make it available to people, thus improving human health and the productivity of labor.

### Credit and Marketing

One of the innovations of the NRL Project was to provide herders with credit for the purchase of millet. This has added directly to their well-being, but, in addition, it has also contributed indirectly by stabilizing animal production through improved herd management. This is because herders are frequently required to sell animals at the end of the dry season, when they are in poor condition and fetch low prices, in order to buy cereals. With access to credit, herders are able to avoid this capital constraint and better manage their herds.

Herders' ability to rely on the market for the sale and purchase of animals at relatively known and stable prices is an essential factor in managing their herds. It means that they can increase or decrease herd size relatively easily without sustaining high losses in marketing. They might, for example, sell off some of their animals in good condition at the end of the rainy season and buy animals again, when their price is relatively low, at the end of the dry season. A well developed market also facilitates destocking in drought years. The effectiveness of marketing is enhanced by the presence of rural financial institutions affording opportunities for saving.

### Evolutionary Operational Program

NRL was frequently criticized by the GON as being "all research" even though there was considerable progress in carrying out pastoral development activities and supporting the Livestock Service. The 1981 evaluation recognized this problem, and suggested that

"The danger for the second phase is that parties may consider the research to be finished when, in fact, there is need to build on the results of the first phase and to institutionalize the research capability within the GON."

The NILP Project was designed with this in mind. The design team considered that the best solution was to introduce a process approach to research and development in which the activities become progressively more applied over time and no great distinction is made between research and development. Called the "evolutionary operational program", the approach is described in detail in Annex 8 of the Project Paper. Each potential intervention is carried through phases which include controlled research, field trials, socioeconomic evaluation,

limited implementation with monitoring, and general application. In some cases the phases may be pursued concomitantly.

The evolutionary operational program has been adapted successfully to several of the activities of the NILP Project. Experimental herding units have been selected from several GMP for the preapplication phases of the program, in particular the vitamin A and forage improvement programs. There has been notable GON participation and support.

### Range Management

A number of key working hypotheses regarding range management were built into the design of the project. Substantial evidence to support these hypotheses existed at the time this design took place, but the need for close monitoring during the course of the project was also apparent.

### Nomadic Movements

The pastoral zone is characterized above all by high variations in rainfall, over both space and time. To compensate for this, pastoralists move their animals frequently and sometimes over long distances. One of the most important movements occurs during the hibernage, or rainy season, when herders go to areas where new, highly nutritious grass is available for a brief period of only a few months. As these areas dry up, most of the herders in the zone retreat back into their customary dry season areas where water and pasture are usually available until the next rains. In bad years, however, most herders will have to again move to wherever pasture or feed can be found. In very bad years, such as this one, distances over which animals have to be moved may be very long and losses substantial.

Complex traditional systems exist for regulating land use under such varying conditions. Custom, kinship, and common social values are important factors in assuring adherence to established norms of behavior or in applying sanctions when these norms are violated. Nevertheless, rapidly changing conditions associated with such factors as population growth, climatic variation, and the introduction of new technology can lead to a breakdown of these adaptive mechanisms. The result may be overgrazing and degradation of the land.

This was an important issue at the time of the design. It was recognized that most livestock projects in Africa have foundered because they have been based on the premise that control of grazing is a precondition to increasing production. Yet attempts to bring about that control in the face of highly fluid movements and complex traditional systems of regulation were unsuccessful. Would it be possible to build, instead, on these traditional systems and work with people rather than land?

The range management specialist and the ILCA range ecologist on the design team thought that it would be possible. They noted particularly the resilience of the environment, especially of the annual grasses, to

drought and overgrazing. Degradation could be found in the zone, but mostly around permanent watering points and along marketing trails. Evidence from the PPS project in northern Mali also suggested that overgrazing was not a major problem. The decision was made to go ahead with this approach of not interfering with nomadic movements but to monitor the situation carefully.

Two years later, there is widespread agreement that this working hypothesis must be reviewed. Most range specialists in the area now agree that there is considerable degradation of the rangelands, but they are uncertain as to its cause -- drought or overgrazing. The current drought is one of the worst, if not the worst, of this century. This follows four years of increasing drought intensity. Rainfall during the past 18 years has in every year been below the average over 60 years. Geological evidence on the size of Lake Chad suggests that drought of this magnitude occurs once in a century. It would be very surprising if there were not serious degradation under these conditions, but how would the land look if there were 20 years of average rainfall, to say nothing of precipitation above the average?

#### Range Management in Dry Season Areas

While it is recognized that it is difficult to control nomadic movements of herders and their animals and thereby to improve the rangeland in general, it may be possible to do something in the traditional dry season areas where control over land use is tighter. This is especially important for planting or encouraging shrubs and other perennials as an important source of protein during the dry season. In addition there may be possibilities in these areas for making better use of early rains.

NILP has been testing a number of interventions in dry season areas that are in fact becoming part of the rolling design. This is especially appropriate now that emphasis is being placed on managing dry season areas in order to mitigate the impact of drought. Forage reserve species have been ranch tested and catchment structures have been implanted in the dry season areas where the project is currently working.

#### Regulating Water Points to Control Pasture Use

Water point development is a controversial topic, especially when it concerns high capacity sources. If many animals are brought to a bore hole, the surrounding vegetation may be consumed to such an extent that it can no longer support the trek between pasture and the water point. Such a locus becomes "overstocked" and - depending on many other factors - may decline in quality and productivity, and possibly contribute to desertification. In the past the GON politically has been unable to control pasture use by closing bore holes as pasture became scarce. There are always pressures to keep the water flowing. But more important, during good years there is little apparent need for regulation and during very bad years herders congregate at these locations anyway because they represent important points of contact

with a resident GON representative who may be able to expedite relief aid.

NRL water point research has found that certain types of water points are used by herders to regulate pasture use. These are all low capacity sources that are commissioned or dug by the resident herders. They are usually shallow unlined wells. Ownership confers de facto ability to regulate the use of surrounding pasture by denying, offering, or selling water. The research indicates that very prominent socioeconomic relationships are developed this way, and that stable patterns of land use thereby exist.

The GON would now like to develop a network of water points in the pastoral zone by extensively tapping the subterranean Niger basin. If this is to be combined with some degree of pasture regulation, the water points will probably have to be privately constructed by GMP members with partial credit financing, as recommended in the NRL water point report. This activity could be closely linked with other GON activities such as the herd health program.

## PROJECT OBJECTIVES AND ATTAINMENTS

### Goals and Purpose

As stated in the Project Paper, the NILP is to further the AID and GON goals of increasing the wellbeing of pastoral zone inhabitants and enlarging the contribution of the pastoral sector to the national economy in a way that is technically, financially, and institutionally sustainable over the longer term.

"The achievement of these goals will be reflected in measurable increases in meat and milk production within the pastoral zone, the increased purchases of basic production and consumption goods by livestock owners and producers and, in general, improved standards of nutrition, health, literacy, and general skill levels throughout the zone. A useful indicator of the achievement of these goals will be lack of chronic food shortages as evidenced by stable food prices and a positive balance of trade in basic food items (i.e value of food "exports" from the project zone will exceed the value of food "imports" into the zone). Research studies will continue to develop the required baseline and monitoring data to assure that the goal is being attained. Assumptions for achieving those targets are that 1) the GON commitment to promoting food self-sufficiency remains high, 2) the marketing system maintains at least its current level of efficiency, and 3) the climate, rainfall, and environment do not significantly worsen as a result of external circumstances. The GON must also maintain an open attitude and dialogue toward policy reformulation, particularly as concerns the expanding role of the private sector and livestock trade." (Project Paper, p.22).

The project purpose in pursuit of these goals was (1) to establish a herder organizational structure that would serve as a vehicle for the

testing and transfer to herders of technical, financial, and managerial innovations; (2) to increase the capacity of the GON to provide services to the herders through this structure; (3) to assist the GON in establishing a policy environment conducive to the attainment of the project goal; and (4) to assure that this structure, capacity, and environment continue to be maintained after the project is completed. Although it was clear that progress towards achievement of these goals and purpose would require quantitative monitoring, the NRL project had not undertaken much of the work in animal production that was necessary in order to establish specific quantitative targets. This activity was to be given high priority during early implementation of NILP. At the same time, baseline data would be gathered related to herder income and expenditures, nutrition and health status, levels of literacy and skills, and market flows and prices. Just when data gathering was to begin, however, the 1985 drought occurred and this effort, with the exception of the market observations, had to be temporarily shelved.

### The Need for a Drought Strategy

One of the assumptions for achieving project goals was that "the climate, rainfall, and environment do not significantly worsen as a result of external circumstances". This did not imply that the project could not help to alleviate some of the effects of drought or to rebuild herds after it was over, but merely that it would be difficult to measure these effects in terms of specific quantitative targets in the face of such a powerful exogenous influence.

A major objective of the project is to develop a drought strategy. At the time the Niger ILP project was designed, however, there was little knowledge upon which to base such a strategy. The main element included in the project for this purpose was development of an Early Warning System, one component of which would use satellite imagery, calibrated by aerial surveys and verified on the ground, to estimate the biomass available in different parts of the pastoral zone at the end of the rainy season. The Early Warning System also included other indicators of potential disaster, such as a Pastoral Food Security Index, showing the relation between livestock and food prices in the market. Longitudinal nutrition and health surveillance through regular measurements of key indicators were also to play a major role. All this information was to be monitored continuously by an interdisciplinary Pastoral Ecology Monitoring Unit and would provide both herders and the government with advance warning of adverse conditions so that timely action could be undertaken to locate additional pasture, to import more cereals and supplementary feed, to encourage rapid and massive offtake, and to otherwise deal with the situation. Once extended to the entire West African region, the Early Warning System would provide objective evidence of impending difficulties necessary to coordinate relief between the nations of the region.

It was clear, however, that this was but the first step in developing a drought strategy. Other elements would be added as experience was acquired and knowledge increased. This is precisely what has happened this year. Although the consequences of the drought have been catastrophic for many herders, the experience has been monitored, pilot

efforts have been attempted, and a new drought strategy is beginning to emerge. This has as its principal element the diversification of activities within the pastoral zone. This will give herders and others the opportunity to shelter themselves from drought's worst effects, and at the same time, help them to resume their herding activities after the drought is over, thus providing useful employment in a country where productive work is scarce and the population is able to exploit a natural resource with no viable alternative uses.

### Reorientation of GON Livestock Strategy

The GON's strategy for developing livestock has been in a state of flux for some time. While the government is anxious to incorporate herders into the national polity and is aware of the importance of the sector in the national economy, there is also concern that the pastoral zone is subject to erratic fluctuations in the ability to support its population. At the same time, there is awareness of the problems of population pressure on the land in the agricultural zone and rising unemployment in urban areas. Consequently, the government is searching anxiously for a means of retaining people in the pastoral zone but, at the same time, assuring them some protection against the effects of drought.

In early April 1985 a livestock conference was held in Tahoua as part of an effort to define such a strategy. The conference involved representatives from government, herders and farmers, and donor agencies. Although the findings and recommendations of the conference are varied and will be the subject of further discussion for some time, several major elements emerged.

There is, for example, increased emphasis on the need to regulate the use of land within the pastoral zone. Greater importance is also attached to creating an extended network of water points so as to be able to exploit the zone more rationally. Failures are pointed to in livestock marketing and attitudes of extension workers. More emphasis is placed on cooperatives and the private sector in distributing inputs and outputs. Reserves of food and animal feed are seen as essential. Other strategic considerations relate to financing of veterinary campaigns and research.

Some of these elements will undoubtedly be incorporated into NILP, either as part of the forthcoming evaluation and reorientation of the project or within the rolling design context of annual workplans and other written forms of understanding. It will be important as this process unfolds not to lose sight of the knowledge we have gained in the past few years and the lessons we have learned from other livestock projects in the past.

### Project Outputs

Despite the severe drought experienced during 1984-85, the project has had considerable success in attaining its purpose through the achievement of specific outputs. The following is a summary of the project outputs presented in the Project Paper and of the

accomplishments of NILP to date. Details concerning progress in implementation are presented as Annex A.

### Herder Organization.

The Project Paper called for the organization of 110 to 190 new herder associations and 8 pastoral centers. Thirty to sixty of these GMP were to be established during the project's first two years. Livestock and cereals credit programs were to be continued and two experimental herding units were to be established. A socioeconomic research program was also going to be undertaken.

Thus far there are a total of 16 associations, including 10 formed under NRL, that have been established or are in the process of being established around the Pastoral Center at Abalak. Their experience has been vital in providing the basis for expansion of the program. Experience with these associations and their credit program has been formally surveyed and evaluated. Modifications are currently being made to improve its effectiveness. Two experimental herding units (GMP pilot) have been formed and are participating in Vitamin A and other field testing.

Twenty new associations are to be organized before the end of this year. Herders have been contacted in the dry season areas where they are involved in small-scale irrigation. A census has been administered to these herders in the In Gall, Abalak and Dakoro areas as a prelude to their organization. A second Pastoral Center at In Gall has been established and planning for a third one in the Dakoro area is underway. Preparations are being made to follow up these censuses with an ongoing sample survey for the purpose of monitoring and evaluating the progress and impact of the project.

In addition, the following specific tasks have also been accomplished:

1. Orientation of local government authorities concerning herder organization activities.
2. Development and implementation of a training program for extension agents and pastoral center chiefs.
3. Monitoring of herder movements during the drought.
4. Establishment of a computerized monitoring and evaluation system for the herder associations and their credit program.
5. Ongoing study of GON credit policy in the pastoral zone.
6. Reorganization of the credit accounting system.
7. Operation of the credit program.

Despite the success that has been achieved, the Herder Organization component of the project has lagged behind expectations since 30 to 60

new GMP were to have been organized by the end of the second year. Equally important, the herder training program has not gotten off the ground even for the existing GMPs. A major reason for these delays has been the drought and the subsequent dispersal of herds, often out of the zone. Another reason has been indecision in the part of the GON as to how to pursue the herder organization program. This is treated later as a major issue.

### Animal Production and Health

The following outputs were envisioned in the Project Paper for the Animal Production and Health components over the life of the project:

1. Improvements in milk production per animal and reductions in mortality.
2. Improvements in herd health programs increasing net animal reproduction rates for cattle from 50% to 55%.
3. Development of thermostable vaccines for rinderpest and small ruminant pest.
4. Training of one veterinary auxiliary per herder association.
5. Support for the GON's annual vaccination campaign.
6. Construction and equipping of four veterinary posts and a laboratory.
7. Field research and trials.

To date, steps have been taken toward the fulfillment of each of these objectives. In keeping with the production objectives of a herd health approach, the animal production and health interventions have been integrated as described in the Project Paper. Interventions to increase production output include hand pitted early grazing sites, vitamin and trace mineral supplementation, and herd treatment for several common epidemic infectious diseases. Some GMP have been recognized as experimental herding units to encourage pastoralists' participation in field trials.

A detailed survey of the nutritional value of natural forages has been carried out with the objective of determining the need for strategic feeding practices. Survey and monitoring methods have been developed but not yet applied to determine habitat utilization, animal productivity, and reproductive performance.

The project has partly financed the rinderpest vaccination campaign, which has contributed to the apparent elimination of rinderpest in Niger after several recent years of reappearance. Four additional veterinary posts are under construction at future pastoral centers. A drought emergency animal bank for goats, camels, and cattle has been established at Ibecetene Ranch and a comprehensive herd health program

has been applied. A mobile animal restraint corral was designed, built, and tested in the herd health program.

Research at the Plum Island Animal Disease Center has resulted in concrete recommendations to improve the effectiveness of the rinderpest vaccine. Epidemiological survey samples for several diseases have also been delivered to PIADC. The outreach veterinary laboratory in Tahoua has been extensively equipped and is in operation.

Further veterinary auxiliary training is required for GMP members.

#### Natural Resources Management

The following outputs are listed in the Project Paper:

1. Study, analysis, and testing of watering technology in the zone.
2. A land resources inventory based in aerial surveys.
3. Testing and extension of proven range management techniques.
4. A program of limited water development via the herder association mechanism.
5. The establishment of a Pastoral Early Warning System.

Water point data from NRL were extensively analyzed and a map guide to the zone was produced. Other resources of the zone are detailed in a comprehensive atlas which was published. A sociopolitical analysis of water point usage resulted in a comprehensive plan to develop private water points through the GMP credit program.

Development of the natural resources component of the Early Warning System is in progress with the selection of 25 ground truth sites. A woody plant cover survey was undertaken at 12 of the sites. It was calibrated from three sample sites and a BASIC program was developed for the analysis. Satellite synoptic AVHR NOAA images have been purchased and are being analyzed by ILCA, and collaboration was established with a university in Japan for obtaining high resolution scenes to monitor environmental quality in the zone. A linear multiple regression analysis of five parameters was used to develop a rainfall-biomass model which is being tested. Aerial surveys of the zone have been initiated.

A nursery was established for dry season forage species at Ibecetene Ranch and success was obtained with several species. The point has been reached where off-station trials may begin. New species are currently being introduced.

Participant training has been most successful in the natural resources area, with several short courses in satellite imagery interpretation attended by the range counterpart, and several participants sent to the U.S. for a range conference, an international seminar, and field visits.

## Marketing and Economics

Marketing and economics are included together here since these activities are carried out by the same division. Project Paper outputs consisted of:

1. A marketing information system.
2. A Pastoral Food Security Index.
3. The development of marketing models.
4. Eight to ten economic evaluations and studies.

A system for monitoring livestock markets has been developed and extended to 22 markets both within and outside the project zone. The extension of this system has involved training approximately thirty persons in the operation of the system through three week-long training sessions. The system provides data on a weekly basis regarding livestock transactions and cereal prices. These data have been used to generate monthly reports on conditions in the livestock markets in the project zone. The monthly reports analyze livestock price, presentation, and sales trends; a Pastoral Food Security Index is also calculated to reflect the terms of trade between meat and cereal in the zone. These monthly reports are broadly distributed throughout the government to provide timely information on the livestock sector to policy makers. This market information system has been coordinated with similar efforts of the Sud-Tamesna and Centre-Est livestock projects, and together these projects have developed and submitted a proposal for redesign of the national livestock market data collection system.

A market model which will detail the structure and conduct of the livestock markets in the zone and quantify the value-added and economic transfers at each stage in the market chain is also currently being elaborated. This model will contribute to analyses of the performance of the livestock market, and of ways in which the government might intervene to improve it.

In cooperation with the Herders' Association component of the project, the economists on the NILP have elaborated and administered a baseline census questionnaire to about 2500 families throughout the project zone. A preliminary analysis of the census has been conducted which provides both administrative information for the creation of herders associations among these families, and data on their social and economic conditions.

The economists have also undertaken a number of specific studies designed to pave the way for future project activities. These include an analysis of pastoral center stores, a feasibility study of pastoral storage facilities, a preliminary study of recurrent costs of veterinary posts, dispensaries, pastoral centers, and pastoral center primary schools, and feasibility analyses of the animal saving scheme

and the dry season gardening component of the Drought Emergency Program. An analysis of data gathered under NRL has also continued, providing valuable insights into herder behavior.

A final important activity of the economists has been the development of a system for monitoring the effects of the drought on herders of the project zone. For this purpose two survey instruments were created one was administered to herders randomly selected in 12 livestock markets, especially in the south of the project zone; the second was administered to herders settled around dry season waterpoints, or in refugee camps. Preliminary results of these surveys have been published in a report which provides valuable information on the human and animal conditions among pastoralists as a result of the drought, and the survival strategies of these people.

In addition to the above activities, several other tasks have been carried out by this component of the project.

1. Installation and maintenance of 7 micro-computers and accessories for the project.
2. Training of project personnel in the use of the computers, and development of customized software for project activities.
3. Supervision of the project library and documentation center.
4. Coordination of quarterly and annual workplans and evaluation reports for the project.

#### Human Resources Development

The following specific outputs were listed in the Project Paper:

1. Training of 100-200 health auxiliaries from herder associations.
2. Construction of 2 dispensaries at pastoral centers.
3. Expanded training of MOH health care personnel.
4. Development of a system to identify emergent health problems.
5. 900 functionally literate pastoralists.

The activities of the human health and nutrition component of NILP were initiated in October, 1984, following the delayed arrival of the project Senior Physician. Since then, the following activities have been accomplished:

1. Training of 48 securistes (human health auxiliaries) and 58 matrones (traditional birth attendants) at drought victim camp sites, emphasizing training of pastoralists from existing or developing herder associations (nearly 50% of the project goal). Necessary basic medicines, at a project cost of ten million CFA

(\$22,000), have been provided to local government health personnel together with logistical support (e.g. gasoline) for oversight and implementation of the program.

2. A three day program in public health and nutrition for local nurses of the MSP/SA (Ministry of Health) was held in Tahoua in January/February. Twenty persons attended (17 nurses, three physicians). Emphasis was on establishment of priorities for action, and definition of principal health problems of drought refugees, the nutritional and health status of populations, and the proper conduct of nutritional rehabilitation programs. A similar seminar in June 1985 was devoted to evaluation of achievements and effectiveness of health service systems at the drought sites. Planning is underway for a third seminar, to be held in Tahoua in October 1985, which will be devoted to epidemiological techniques to be applied to health and nutrition in pastoral peoples.

3. As an outgrowth from the initial seminar on health and nutritional planning, nutritional evaluations of children have been carried out at drought relief camp sites in collaboration with the local dispensary nurse directors. The project has provided necessary scales and measuring boards, as well as direct technical oversight and assistance. Nutritional rehabilitation programs have been initiated for undernourished children, with project assistance providing 3,000 liters of high caloric oil. The project has also provided 2,250 kg of soap to assist in refugee site sanitation efforts.

4. Development of construction plans for two dispensaries at proposed new pastoral centers at Amatal and in the Tofemanir region is in progress. Dispensary design has been completed and requests for bids distributed. Completion is estimated for early 1986.

#### Project Management

The following outputs are listed in the Project Paper:

1. Establishment of a management information system.
2. Preparation annually of detailed management plans.
3. Monitoring and evaluation unit to gather data from, report on, and evaluate components of project.
4. Annual in-country conferences.

NILP is fully staffed and equipped in Tahoua. Vehicles have been delivered and procurement and administrative procedures are in place. An accounting system has been established and certified by AID. A monitoring and evaluation system is functioning as a tool for project management.

Detailed management plans are prepared annually as the project's work plans. Annual in-country conferences are scheduled as part of AID's fall review.

As the drought situation unfolded this year, emergency actions and careful monitoring by the project, outputs not listed in the Project Paper, resulted in the emergence of a cohesive strategy to mitigate the effects of drought through diversification of economic activities within the zone (see J. Dirck Stryker and Albert Sollod, "The Search for a Pastoral Livestock Production Strategy," March 15, 1985). This strategy will be increasingly tested in the months to come and could become the basis of AID policy in the pastoral zone. The project has also intervened directly to aid herders through shallow well construction, provisions of seeds and other inputs, trucking of animals out of areas where they are trapped, holding of young animals for herd reconstitution, medical assistance to refugee camps, and a dried meat program.

In addition, the following specific tasks have also been accomplished by project management:

1. Preparation and approval of 1984 Workplan.
2. Preparation and approval of Programme d'Urgence.
3. Preparation and submission of 1984 annual report and quarterly reports.
4. Rental, furnishing, maintenance, and repair of project offices, warehouse, and housing.
5. Maintenance and repair of project vehicles.
6. Preparation of detailed 5-year financial plan.
7. Establishment of inventory control and reporting system for procured material and equipment.
8. Maintenance and internal audit of project accounts.
9. Ongoing supervision of project by Senior Advisory Group, including frequent missions to Niger.
10. One meeting of the Joint Enterprise Interuniversity Review Committee.
11. Monthly publication of NILP Newsletter.

#### Project Inputs

The Contract between Tufts University and the Government of Niger commits the University to provision of the following inputs:

A. Personnel

- 1. Long-term technical assistance - up to 43 person years
- 2. Short term - up to 8 person-years
- 3. Senior Management - up to 21 person-years
- 4. Administrative Support - up to 9 person-years

B. Training

- 1. Long-term - up to 31.5 person-years
- 2. Short-term - up to 40.5 person-months

C. Commodities

- 1. Scientific Supplies
- 2. Communications Equipment
- 3. Computers and software
- 4. Books, journals and documents

TOTAL: \$309,000.00

The following inputs have been provided by Tufts through August 31,1985

A. Personnel

1) Long-term technical assistance:

|                                     |                    |
|-------------------------------------|--------------------|
| Financial Specialist                | 16.5 person-months |
| GMP Coordinator                     | 20.0 person-months |
| Animal Production Advisor           | 20.0 person-months |
| Epidemiology & Reproduction Advisor | 21.0 person-months |
| Animal Production & Health Monitor  | 11.0 person-months |
| Range Management Specialist         | 20.0 person-months |
| Quantitative Range Technician       | 16.0 person-months |
| Livestock Economist                 | 17.0 person-months |
| Marketing Specialist                | 18.0 person-months |
| Public Health Physician             | 10.0 person-months |

Total long-term technical assistance: 14.13 person-years

2) Short-term:

|                             |                  |
|-----------------------------|------------------|
| Research Interns(7)         | 14 person-months |
| Range Management Consultant | 2 person-months  |
| Management Consultant       | 4 person-months  |
| Public Health Specialist    | 1 person-month   |
| Rural Sociologist           | 3 person-months  |
| Virologist                  | 1 person-month   |

Total short-term: 2.08 person-years

3) Senior Management:

|                                       |                    |
|---------------------------------------|--------------------|
| Campus Coordinator                    | 11.0 person-months |
| Training & Technical Coordinator      | 11.0 person-months |
| Social Science Coordinator            | 5.5 person-months  |
| Public Health & Nutrition Coordinator | 5.5 person-months  |
| Chief-of-Party                        | 9.0 person-months  |
| Deputy Chief-of-Party                 | 19.0 person months |
| Total Senior Management:              | 5.08 person-years  |

4) Administrative Support:

|                              |                    |
|------------------------------|--------------------|
| Campus Administrator         | 22.0 person-months |
| Staff Assistant              | 22.0 person-months |
| Secretarial                  | 11.0 person-months |
| Total Administrative Support | 4.58 person-years  |

B. Training

|                |                 |
|----------------|-----------------|
| 1) Long Term:  | (none provided) |
| 2) Short-term: | 8 person-months |

C. Commodities

|                                |           |
|--------------------------------|-----------|
| 1) Scientific Supplies         | \$74,520  |
| 2) Communications Equipment    | \$ 4,761  |
| 3) Computers & Software        | \$51,568  |
| 4) Books, journals & documents | \$ 6,640  |
| Total:                         | \$137,489 |

**MANAGEMENT ISSUES**

There are a number of current management issues that should be brought to the attention of the evaluation team in order that they might be explored and resolved. Several of these issues were raised in a letter dated March 21, 1985 from the Campus Coordinator to the Minister of Rural Development.

Ability of Technical Assistance Team to Work

Sometime after the Project Paper was prepared, the GON raised concern over the level of technical assistance in the project. This issue was first raised in the Proces Verbal included as Annex A of the Grant Agreement. Later, during Tufts contract negotiations in November 1983, the level of long-term technical assistance was reduced from 51 to 43 person-years. Subsequently, in his letter to AID/Niamey of 9 January

1984, the Minister of Rural Development stated that his signing of Tufts contract was contingent upon a further reduction in technical assistance, inclusive of indirect cost recovery, to a target level of 34 percent of the total cost of the project.

Extensive discussions on the issue were held in July 1984 between Tufts and the GON. During these discussions a detailed personnel plan was drawn up, which indicated when qualified Nigerien personnel would be ready to replace expatriate technical assistance. On the basis of this plan, a 5-year projet du budget was prepared as an integral part of the 1984 workplan. This projet du budget was communicated by a letter dated July 26, 1984 from the Campus Coordinator to the Minister of Rural Development. Although no written reply was received, verbal assurances were made by the Project Director that the Ministry found this plan and budget to be a satisfactory basis for continuing implementation of the project.

Despite these assurances, members of the technical assistance team have repeatedly found themselves blocked in their efforts to travel, work with herders and officials of the government, and in general carry out their assignments. This has been true despite official approval of annual workplans and the Programme d'Urgence by the GON and AID, as well as the official introduction of team members to all concerned GON officials. The result has been a high degree of frustration and the failure to accomplish assigned tasks. Particularly aggravating has been the lack of direct contact between the TA team and the herders with whom they should be working.

The evaluation team should investigate this issue in detail with the Project Director, Nigerien staff, and members of the Tufts team. It is essential that institutional safeguards be designed to prevent a continuation of these frustrations. The following specific recommendations are offered:

**Recommendation 1:** The Chief-of-Party should be authorized to sign Ordres de Mission for Nigerien staff and members of the technical assistance team in order to expedite travel and reduce bureaucratic delays. He would, of course, coordinate with the Project Director. Consideration should be given to issuing long-term ordres de mission to project personnel in order to facilitate operational movement.

**Recommendation 2:** The policy should be established in writing that members of the technical assistance team are automatically authorized to contact officials of the GON at the technical level (below Secretaire General) for the purpose of exchanging information after they have officially been introduced.

#### Role of the Chief-of-Party and Other Team Members

Of major concern has been the role of Tufts' Chief-of-Party (COP) vis-a-vis the Project Director. Originally the COP was to have fulfilled three major functions:

1. Act as chief advisor to the Project Director on all matters related to project administration and management.
2. Serve as Chief of the Division of Administration and Finance.
3. Act as administrative head of the technical assistance team.

Under three successive COPs, only the last role has in fact been permitted despite an obvious need for administrative and management experience and skills. Instead the Project Director has shut the COP out of the decision-making process, not allowed him to take on any of the project's administrative responsibilities, and has not kept him informed of decisions taken on important events.

Furthermore, the position of expatriates in general is not well defined. With some notable exceptions (e.g., the Chief of the Division of Studies and Programming), they do not hold specific positions within the project organization but are managed as employees of the Nigerien civil service and report to their respective division chiefs. Lines of authority and responsibility are unclear, and the skills and experience of technical assistance team members often go unutilized. This has resulted in widespread inefficiencies and wastage of time. Because of a lack of experience with USAID procurement and accounting procedures, for example, the Nigerien head of the Division of Administration and Finance has fallen severely behind in providing both commodities and operating expenses for the project while the Chief-of-Party, who has this experience, has not been permitted to assume any of these responsibilities.

Tufts University considers this situation to be intolerable if we are to continue to be involved with the project. Accordingly, we offer the following recommendations.

**Recommendation 1:** A specific mechanism must be found for involving the Chief-of-Party directly in the administration and management of the project. One alternative might be to require that the Chief-of-Party sign off on financial reports, Notes d'Agreement and other important documents. Another might be to make the COP head of both the Division of Administration and Finance and the Unite de Gestion. The Unite, comprising the Project Director, the COP, the DCOP, and the division heads, is supposed to monitor the project and to advise the Director on management issues, but it has never functioned effectively.

**Recommendation 2:** The positions of the members of the technical assistance team should be clearly defined. They should have operational responsibility and authority unless clearly designated as counterparts, to qualified Nigeriens, which should be temporary assignments of no more than a few months duration. At the end of this time, the expatriates either should be reassigned to specific positions within the project or should leave.

## Herder Organization

The issue of the establishment of GMPs and their development is critical to the project. In the 1984 workplan, 10 GMPs and 4 Pastoral Centers were to be set up; in the 1985 workplan, 10 new GMPs and 2 new Pastoral Centers were to be established. To this day only one Pastoral Center has been set up (in Ingall) and 15 GMPs are in the process of being identified.

The initial philosophy of the project was to center all project interventions around the GMPs. However, project activities have been scattered away from the GMPs and project staff have even had difficulties monitoring and working with existing GMPs and Pastoral Centers. As a result, human health activities are centered on the camps and food distribution sites, technical interventions have been oriented towards the government ranch of Ibecetene, and drought monitoring activities such as the crisis survey have been conducted only in markets and in gardening sites.

The official reason for the delay in GMP formation is the drought and the migration of herders outside the zone. Nevertheless, the political willingness of the GON to organize herders within the GMP framework can be questioned. It seems there is a hesitation at the implementation level due to the sensitive political situation of the pastoral zone. Only at recently established garden sites, where control is easier to exercise, is the GON implementing a policy of agropastoralism and stabilization of the herders around these areas. The critical issue, then, is how to structure GMPs so that the Government does not feel threatened by their creation, and yet ensure their effectiveness as instruments for herder organization and channels for NILP interventions.

**Recommendation 1:** The original principles of GMP formation presented in the project paper should be maintained. The project paper states that GMPs should provide the framework within which responsibilities should be spread to ensure the successful undertaking of development activities. The spreading of responsibilities within GMPs can be facilitated by the following approaches:

1. Activation of the program to recruit and train GMP members as non-governmental extension workers.
2. Expansion of the extension program, which currently addresses the areas of animal and human health and literacy training, to include range management activities such as forage reserve plantations and haying trials.
3. The participation of women in GMP development should be sought through activities involving their collective organization.
4. Other collective management activities should be explored, such as the development of private wells to be managed by GMPs expressing a need in this area. In the future this type of intervention could be used to promote the development of grazing controls.

**Recommendation 2:** The basis for setting up GMPs should be expanded to include garden sites only if the following conditions are respected to ensure the viability of the GMPs:

1. Good potential exists for the success of cropping activities.
2. Herding activities are pursued by the site population.
3. The location of the sites respects the traditional transhumance zones of the herders.
4. The ethnic and tribal homogeneity of the population grouped around the sites is considered.
5. Agricultural expertise is to be made available through the project. Agricultural specialists should be trained within the GMPs and training programs for extension workers should include an agricultural component.
6. The efforts to form GMPs around garden sites should not exclude from the GMP program herder groups who still engage in extensive pastoral livestock production.

**Recommendation 3:** In the initial phase of GMP development, contacts between the GMPs and project staff, including expatriate technical assistance, should be in the form of regular visits from the Pastoral Centers to the GMPs. Over the long term, however monitoring can be assured through periodic contacts at the Pastoral Center level to reduce the costs of field visits.

**Recommendation 4:** GMP monitoring should not only involve a flow of information from the GMPs to the project, but also should include a reverse flow as well. Thus information that could be useful to the herders, such as that relating to pasture and market conditions and animal and human health, should be disseminated back to the GMPs through the monitoring channel.

**Recommendation 5:** To ensure the long term viability of the NILP Pastoral Centers, we recommend that they be merged with the livestock posts. This would develop the extension role of the veterinary posts and increase the participation of the livestock service in project activities. In this case, the plans that are now being drawn up for the new veterinary posts should be revised so that the infrastructure could fit this new role. The combined units could be called Pastoral Development Extension Centers, which would better reflect the nature of their activities.

**Recommendation 6:** The location of Pastoral Development Extension Centers should continue to be close to large livestock or grain markets to ensure permanent contact with herders engaged in extensive pastoral livestock production.

## Pastoral Zone Extension Activities

The NILP project paper adopted the system for delivery and maintenance of human and animal health and production inputs that was initiated by the Niger Range and Livestock project (NRL). This entailed the training of herders as nongovernmental extension agents by the Service Animation and the Livestock Service. Results of research activities from the first phase (NRL) and those which would be on-going during the second phase were to be incorporated into the training programs for these herder agents.

Since January 1984, there have been several groups of human health auxiliaries trained, and two groups of veterinary auxiliaries (VAs) are scheduled to be trained during August and September 1985. Attempts to carry out these training programs have brought several important problems to light:

1. VAs have often not received initial stocks of supplies and have very rarely been restocked.
2. There is insufficient appreciation of the need for the development of new intervention packages to produce increased animal productivity and little support for field research and other activities directed towards this end.
3. There is very little central contact in the area of extension between NILP and MDR, which precludes an institutionalization of the results of NRL and NILP field trials into the GON VA program.
4. Generally, poor relationships exist between the Livestock Service agents and the herders who are trained as VAs.

To ensure the successful implementation of the extension program for the pastoral zone of Niger, we make the following recommendations:

**Recommendation 1:** The system of extension in the Livestock Service be given strong high level support. Individuals at the ministerial, departmental, and arrondissement levels should be nominated with their sole responsibility the implementation of agricultural extension through herder extension agents (veterinary auxiliaries). NILP technicians must have a clear line of access to all of these individuals to insure that successful project innovations are incorporated into the program at all levels.

**Recommendation 2:** Support at the national level be given to the Livestock Service and Nigerien research institutions such as INRAN and LABOCEL to continue the program of applied research and field trials (evolutionary operational program) which has been initiated by NILP in support of the pastoral zone extension system.

**Recommendation 3:** The project assist in the establishment of a well-organized system of commodity supply and support which efficiently delivers material and equipment to the field. To this end, a **predictive system of restocking** must be established to ensure that necessary products that have a seasonal demand are at the level of the

veterinary posts between three and six months before they are likely to be needed. The line of responsibility for delivery of these products should be more clearly defined. As the system currently operates, there is ample opportunity for the Livestock Service and VETOPHAR to place the blame for delivery failures on the other side. A successful program will require a high level commitment to the timely delivery of these products by all organizations involved.

**Recommendation 4:** Project extension activities should be broadened to include appropriate agronomic and range management practices which could be implemented through intervention packages. To date training has been largely directed towards animal health inputs including animal production and nutrition. There is much that can be done however, in the fields of range management and agronomy. Effective range management practices could be applied at the GMP level in a pastoral setting and at garden sites. This would result in a decrease of the effects of nutritional stress during the late dry season period when forage availability is lacking. At garden sites, there will be a sustained need for the introduction of improved agronomic extension packages in the areas of crops, pesticides, and fertilizers.

**Recommendation 5:** Traditional cultural, medical, animal health and production practices should become the basis of formal and informal veterinary auxiliary training programs. A detailed study of traditional veterinary medicine among Touareg, Arab, and WoDaaBe herders should be performed which produces: 1) a technically accurate lexicon of diseases between French and the languages in common usage by herders; 2) a pharmacopeia containing locally accepted treatments for various diseases; and 3) a pictorial "dichotomous key" for use by veterinary auxiliaries containing clinical signs indicating diseases and appropriate treatment courses and intervals.

**Recommendation 6:** The project should provide technical and other support for informal continuing education for veterinary auxiliaries in the following areas:

1. Contact with livestock agents at the arrondissements, veterinary posts, and markets at the time of restocking. Problems that the auxiliary is experiencing in the implementation of the interventions should be discussed and suggestions made as to how to correct these problems. The livestock agent should reinforce the proper usage of each drug dispensed including indications, dosage, and duration of treatment.

2. Public sector mass media radio programs in local languages should be broadened in which the application of the interventions is reviewed or acted out for the benefit of herders and veterinary auxiliaries alike. The importance of declaring unusual or especially severe outbreaks of disease should be reiterated, reinforcing the concept of epidemiological monitoring.

**Recommendation 7:** The project provide technical and other formal support for those responsible for training the VA in the form of:

1. Increased technical and social science input into the curriculum at the livestock agents training school.
2. Seminars organized by the Livestock Service in collaboration with the project to provide continuing education to the trainers.

**Recommendation 8:** The project should adopt the following two strategies to encourage participation and to increase the level of mutual trust:

1. Herders trained as veterinary auxiliaries be used as a means to obtain low-cost epidemiological monitoring of animal disease. Serious outbreaks of animal disease could be detected early enough to permit a Livestock Service response before the problem reached epidemic proportions. This would provide incentive to the veterinary agents as they would get to travel out into the field more often, enabling them to collect additional pay in the form of per diem. Herders would perceive it as useful because the Livestock Service would be showing increased interest in their problems and responding to disease outbreaks more effectively.

2. Further herder participation and trust could be encouraged if the Livestock Service agents in contact with the VAs take note of problems experienced in the application of the extension packages. This information should then be transmitted upward through appropriate, well-defined channels in order that a servicewide change be initiated either through the application of extension research or through programmatic alterations.

**Recommendation 9:** A regular systematic dialogue between those responsible for extension activities in the Ministries of Health and Rural Development should be established to help ensure that the two ministries are applying similar techniques and working towards common goals. Care must be taken to insure that programmatic or incentive changes in one system do not have a devitalizing effect on the other system.

#### PROGRAM ISSUES

There are a number of recommendations that can be made for each of the major program components based on the experience of the NILP project staff to date.

#### Credit Program

The long-range objective of the GMP credit program is to establish a financial institution in the pastoral zone which would both mobilize local savings and offer credit. The program was to be initiated by supplying new GMPs with six-year credits for investment in herds and for financing bulk cereals purchases at harvest prices. Savings were to be gradually mobilized over the reimbursement period through intra-GMP transactions (e.g., grain sales). Results to date have been at best mixed. Sixty-two percent of the cereals credit for 1983 has been reimbursed (with a range of 31% to 99%, depending upon the GMP).

Virtually no reimbursements have been received since the onset of the 1984 drought, and all debt due in 1984 was rescheduled. A low rate of reimbursement in 1985-86 - a distinct possibility at a time when herders must choose between debt repayment and reconstitution - will result in a significant decapitalization of the fund.

The credit program as currently operating is not viable over the long term. The following problems relate to the current design and implementation:

1. Large credits to be repaid over long periods of time were offered to GMPs with no history of creditworthiness.
2. The organization of GMPs was based in part upon the offer of significant credits.
3. Communal herds were purchased through credit when a tradition of collective ownership had not previously existed in the zone.

Furthermore, the program also suffers from the following structural problems less easy to resolve:

1. A lack of incentive on the part of herders to repay donor funds.
2. Generally very poor records of credit reimbursement throughout the zone and the resultant perception of credit as a subsidy.
3. Interest rate ceilings dictated by the central bank that necessitate very high levels of reimbursement if savings are to be mobilized.

**Recommendation 1:** The development of a pastoral zone financial institution should be reoriented from supply-led finance to savings mobilization. The project should establish a system by which GMP members can make individual deposits into a GMP account. These accounts would be maintained at the pastoral center level and deposited into a financial institution. The Caisse Nationale D'Epargne, which has an expanding service network in rural regions, is currently the most likely choice of institution. The accounts would form the basis of GMP credit unions to which all members/depositors would belong. Ultimately, the credit union, with a good financial knowledge of its members, would open a credit window. This might be supplemented in the initial period, before sufficient capital has been accumulated to offer credit, by small loans made to creditworthy GMP out of the project's existing credit fund. By the end of the NILP project the following goals should have been met:

1. Development of credit unions around all Pastoral Centers established through year 2 (year 4 of the project).

2. Disbursement of credit.
3. Overseas training of a Nigerien cadre in rural financial markets.

The savings operation is likely to be more attractive initially in a year of average to poor rainfall than in a good year (particularly one directly following a drought), when investments in herds would be more profitable than holding financial assets. In average to poor years a savings plan will offer herders a mechanism by which to diversify out of risky assets (herds) into secure financial assets and gain access to additional credit which will be valuable in helping herders develop their strategies during a drought.

Requirements for the successful development of this proposal include:

1. The development of herder confidence in the security of their financial assets. The project will have to train accounting and pastoral center personnel and develop careful financial controls. The assistance of an expatriate small savings/credit specialist or financial manager and a counterpart with a financial/business background to supervise operations will be necessary. The project should provide one counterpart with overseas training in rural financial markets.
2. Easy accessibility to the savings institution. Mobile units (as currently operated by the Caisse d'Epargne in some areas), which make weekly visits to markets, may be necessary. Paperwork necessary for all transactions must be kept simple.
3. Continual close involvement with the Caisse D'Epargne (or whichever financial institution is chosen), starting with the design, to assure that the eventual transition is smooth and effective.

Potential problem areas include:

1. High start-up costs and initial low rates of deposits. The project could encourage the opening and use of accounts by offering various incentives, particularly ones which reinforce cooperation among GMP members (e.g., matching funds for deposits in the first year, which could be used as a basis for small credit offerings).
2. High demand by herders for credit during the same period of the year. If not enough net savers eventually join the union, or if herders have not diversified into other economic activities, then other economic actors around the pastoral centers (such as merchants) should be involved in the program. The financial system would thus intermediate between actors with different cash flows. Nevertheless there would still likely be a net transfer, seasonally and internannually, of funds into and out of the zone.

**Recommendation 2:** The possibility of the savings programs working in concert with the cereals operation should be explored. The function of this operation is to purchase grain at the harvest price, stock it, and

provide it at a time of year when the terms of trade are most unfavorable to the herders. The project could continue these activities. But rather than offering the cereals on credit, as it currently does, the project could use savings transferred at the herders' discretion to the cereals fund as a basis for the annual purchase.

### Natural Resources Management

Natural resources management was an important component of the Niger Range and Livestock project. A survey of water points in the project zone was completed and water point use studied. Grazing trials in two different locations were established. Herbaceous biomass production was correlated with cattle weight gains and milk production. Optimal weight gain and gain per ha were determined in relation to ungrazed pastures under different stocking rates of cattle.

The research was performed in fenced ranch conditions, however, and the results are not directly applicable to the communal range management systems as they exist in the pastoral zone of Niger. Consequently, in the NILP project, several issues pertaining to improved range management and better utilization remain to be studied and resolved.

Range management interventions should be based on the experience gained to date and the reality of the pastoral zone. All interventions must be simple and directly applicable in the future. The following specific recommendations should be implemented and tested in different locations of the pastoral zone with the herder's participation.

**Recommendation 1: Browse reserves and water catchment.** Development of browse reserve will undoubtedly provide high-quality forage and improve the livestock diet during the dry season. The presence of browse reserve at the herder's disposal will offer an edge against drought years in the zone. Research is needed in order to know: a) the best ways of propagation, establishment, and protection against unwanted grazing and fire; b) how best to use the forage reserves; and c) which species are more nutritive and palatable. The technique of browse reserve must be mastered under ranch conditions before it can be extended to herders. Water catchment should also be tested to decrease runoff and improve soil moisture in browse plantations. For example, the effect of water catchment on plant growth should be analyzed.

**Recommendation 2:** It is recommended that research and development of forage reserves be done in collaboration with national research institutions such as INRAN.

**Recommendation 3: Soil pitting.** Soil pitting should be carried out to provide early grazing sites with increased forage production and reduced soil degradation. Generalized crust formation greatly contributes to soil degradation, increases runoff, and reduces soil moisture after rains. Consequently the germination of annual grasses is poor and grass cover density is reduced to a minimum with enormous bare areas. Pitting could be done by the herders at individual

family's locations near gardening cropping sites and privately-owned wells. Research on pitting should continue during the life of the project and in collaboration with INRAN.

**Recommendation 4: Hay making.** The practice of hay making in the pastoral zone is unknown. Given the short length of the growing season and the floristic composition of the rangeland, it is recommended that haying trials be conducted in order to know more about: a) the most appropriate cutting time to ensure regrowth before the end of the rainy season, b) the most economical storage facilities; c) the costs of production of hay making; and d) the decrease in the nutritive value of hay due to storage. We recommend that the results of the above tests be extended to GMPs once they are successfully completed.

**Recommendation 5: Government-owned ranches.** Given the poor results obtained to date in GON multiplication ranches and the huge fenced-in grazing areas occupied by these ranches, it is recommended to transform them into grazing areas for the use of herders. These pastures would be grazed by herders under permit in April, May and June, when dry season pastures are scarce. The ranches should also be used for making hay during the rainy season.

**Recommendation 6:** To move towards the realization of grazing control on public rangelands in the project zone, pilot trials should be initiated in which the government gives selected GMPs exclusive rights to all dry season water points in a defined area. The NILP would support these selected GMPs in enforcing their ground water rights by helping them to improve existing wells, and, when necessary, with the construction of new wells. Credit, when needed, could possibly be extended for well improvements or new well construction to GMPs with a good credit rating.

### Early Warning System

The long-range goal of the Early Warning System (EWS) is the development of a timely, systematic evaluation of range production during each rainy season. A projection of this impact, and its effects on correlated economic (market) indicators, and human and livestock health factors is to be provided to the Government of Niger early enough to take effective action in the event of significant drought-caused production shortfalls.

Development of the EWS was delayed in 1984 due to contract problems with ILCA, the subcontractor selected to provide remote sensing data and interpretation. Agreement on the basic contract was reached too late to include the 1984 growing season in the remote sensing analysis. Nevertheless, a ground truth network successfully was established and tested by NILP staff in 1984.

The following recommendations are advanced concerning the implementation, components, and policy effects of the EWS.

**Recommendation 1:** An estimate of herbaceous standing crop or "biomass" should be provided to the GON between Sept. 15 and Sept. 30 each year, indicating the major forage supply for the following nine months.

**Recommendation 2:** A "forage index" map of the project zone should be prepared, using appropriate remote-sensed data collected by a representative, extensive system of ground truth sites. Rainfall records maintained by the National Weather Service, plus secondary stations at livestock posts, police posts, and health centers should be used to supplement ground truth and satellite data, using a precipitation/biomass model developed by the project.

**Recommendation 3:** Estimation of livestock numbers should be used to prepare a UBT/biomass ratio for the zone each year.

**Recommendation 4:** A Nigerien should be trained in the technical implementation and analysis of the EWS. Satellite imagery interpretation, while initially provided by project contractors, should in the long run be made by GON personnel trained at remote sensing centers outside Niger. One Nigerien range management specialist has been partially trained at the remote sensing school at Ouagadougou and this training series should be complete. The ground-truth component of the EWS should also be performed by GON personnel, after initial planning and field testing in cooperation with project technical advisors. ILCA should provide complete methodology and training, including all relevant program software developed under the subcontract, to GON staff to enable them to continue the program as developed by the project.

**Recommendation 5:** It is important that the physical, technical, and financial capabilities of the GON be respected if the system is to continue after the project's termination. There should be no built-in requirements for external data collection and analysis, although advice may be needed from time to time to evaluate and upgrade the EWS. The necessary software for the project IBM personal computers has been developed and tested.

**Recommendation 6:** An estimate of animal health problems over the following dry season should be included, on the basis of forage availability and expected animal concentrations and movements. This would allow the livestock service to be able to mobilize efforts at specific locales where animals are expected to concentrate. These efforts would entail measures directed at preventive and therapeutic veterinary medicine and animal nutrition. Such measures could include mobilization of the animal vaccination campaign against rinderpest and contagious bovine pleural pneumonia and stockpiling of other animal vaccines, therapeutic and preventive drugs, and supplementary animal feed in the regions of expected animal concentrations.

**Recommendation 7:** If the EWS predicts a drought year, officials should increase the monitoring of health indicators to obtain pre-stress data which can increase the sensitivity of later measures to changes in the nutritional well-being of the pastoral zone population. Several months' time may thus be saved in government response to critical

situations. This would permit the early positioning of medical and food supplies, personnel and programs, particularly vaccination campaigns, to avoid epidemiological diseases and to reduce nutritional stress in areas of expected high human concentration.

**Recommendation 8:** An analysis of current price, presentation, and sales data in livestock markets should be included in the EWS report, listing factors that are particularly important to the economic well-being of pastoral residents. Range production data will be used in conjunction with previous market surveys to predict market trends during the following dry season. Accumulation of data for several years will permit a refinement of this general trend prediction.

**Recommendation 9:** In the event that rainfall records, preliminary range survey, and remote sensing data suggest the likelihood of a drought by late August each year, the zone monitored by the EWS should automatically be extended southward to include escape areas where livestock would likely congregate. Evaluation of potential range surplus areas should be investigated in cooperation with proper authorities in such zones, with the realization that livestock fleeing the northern drought area may have to compete with local stock for a reduced forage crop.

**Recommendation 10:** The EWS is a predictive mechanism that should trigger the implementation of drought strategies in a poor year. Drought strategies are activities to be implemented to reduce the impact of drought on human populations and are not part of the EWS. Such strategies should be preplanned, and implementation should be automatic and immediate. Examples are animal destocking, the dried meat program, transporting animals, and human and animal health interventions.

**Recommendation 11:** The EWS report should be provided to the project Director and the Chief of Party, for transmission to MDR, an Inter-ministerial Committee (MDR, Ministry of Health, Ministry of Foreign Affairs), and USAID as well as other relevant concerned parties.

#### Alternative Income Generating Activities

The 1984-1985 drought has at least temporarily impoverished many pastoral nomads. The ability of these people to recover economically, regardless of whether they return to herding, would be greatly enhanced by diversifying the region's income generating activities. Traditional alternatives and/or supplements to pastoralism are limited. Herd reconstitution after the 1973-1974 drought appears to have been aided by income from migrant labor in neighboring countries, particularly countries affected by the oil boom of the '70s, though unskilled labor opportunities within and outside of Niger today are more limited. Buying animals and transporting them to different markets for resale has often helped to generate income, as has the cultivation of the few suitable farming areas. The objective of the following discussion is to propose several other viable long-term alternatives to supplement pastoralism within the NILP zone.

## Forage Improvement

Currently sahelian livestock are confronted with high seasonal and yearly variations in forage quantity and quality. Labor-intensive forage improvement strategies could serve to reduce the effects of both seasonal and yearly forage variations on livestock, and simultaneously provide additional income to herders.

Dry season prices of low quality litter and straw, collected well after the annual grasses have matured and died, ranged from \$110 to \$440 per metric ton in June 1985. Labor-intensive hay making would produce a highly marketable and badly needed resource. A metric ton of high quality hay would substantially improve the condition of 2-4 UBTs when fed to animals late in the dry season.

High quality livestock feed could also be produced on native range lands by planting certain native shrub species and restricting animal access to reserve forage during critical periods. Chemical analysis has shown that these shrub species can supply badly needed protein, phosphorus, calcium, and vitamin A during the dry season when forage quality and quantity reach their seasonal lows (Louis *et al*, 1983). Estimates show that these fodder shrubs could produce 2 metric tons per hectare per year of high quality feed when the animal's condition is at its lowest. In order for shrub plantations to become viable income generating alternatives the GON should recognize grazing right controls on small (less than 20 ha) shrub plantations.

## Meat

Potential markets for meat surround Niger with Nigeria to the south and Algeria to the north. However, border restrictions often affect live animal transport. Potential may exist, however, for the selling of processed meats. Possibilities for meat processing exist such as the drying of meat or sausage production. Currently, the Societe Nigerienne d'Exportation des Ressources Animales (SONERAN) controls the bulk of international animal transactions as well as some dried beef transactions. International meat market development would probably have to be tied to this institution.

## Cheese

Current traditional cheeses store well in dry well-ventilated areas. A possible improvement may be improving market connections with southern Niger. Cheese marketing improvement may not be of immediate concern due to low milk production following the drought.

## Bone Meal

Bone meal is an important source of calcium and phosphorus for animals and in some cases human foods. Bone meal production should be

centralized so that sanitation and sterilization could be controlled to prevent the spread of zoonotic diseases such as anthrax, salmonellosis, and tuberculosis. By creating bone collection centers in the pastoral zone herders could supplement their incomes by selling bones.

### Blood Meal

blood meal is also used in animal feeds. Blood meal collection requires collection ponds and would probably be restricted to slaughter houses in the larger cities of the project zone.

### Fiber

In the U. S. mohair represents approximately 85% of the gross income from Angora goats. However, low reproductive rates and requirements for high quality feed are problems. Currently in Niger the northern breed of goat is clipped for its hair. Selective breeding of these goats may be possible. In Mali, blankets are woven from local fibers but it is unclear whether camel or goat hair is used.

### Skins and Hides

Traditional tanning practices exist in Niger as well as a tanning factory in Maradi. However, these exclusively use sheep and goat skins. Production possibilities may exist for cow hides which currently are exported almost exclusively by Societe Nationale de Cuirs et de Peaux (SNCP).

Development of finished leather goods for domestic use or for export may have potential if quality goods could be produced. Two levels of finished leather goods seem feasible for Niger. The first level would involve small scale mechanization (e.g., sewing machines) and would produce handbags, sandals, belts, etc., targeted for the West African coastal markets. This would offer fulltime employment opportunities for sedentarized pastoralists. The second level would involve local leather crafts oriented to markets in the U. S. or Europe. Products that could be produced would include camera straps, woven leather belts, handbags, key chains, and decorated pens. Part-time labor would be offered primarily for women within their traditional lifestyles.

### Arts and Crafts

Local artisans are capable of producing quality items from wood and silver at reasonable prices. With some training and quality controls, items such as silverware, wooden and measuring spoons, grass woven placemats, baskets, items made of horn, decorated calabashes, etc., could be marketable abroad. Development of foreign markets could be attained through craft cooperatives with quality controls and wholesale contacts in the U. S. or Europe.

### Road Maintenance

Many of Niger's roads are in need of repair and some bush towns are practically inaccessible during most of the rainy season. Road

maintenance tractors and loaders could be replaced with a dump truck and a "pick and shovel" crew to improve and maintain existing bush roads. Though this may cost more than doing it with big machinery, the money would at least remain in Niger and not be lost to machinery and oil companies abroad.

**Recommendation 1:** Short-term consultancies should be offered for specialists in animal by-products, leather, fiber, and arts and crafts/cooperatives.

**Recommendation 2:** Efforts to develop new income-generating activities should be focused around GMPs.

#### Market Data Collection System

The market data collection system is functioning in the project zone as described in the project paper. Data on sales, presentations and prices are collected for livestock and major cereal products on a weekly basis in 25 livestock markets. A bimonthly census collects data on the age and species of the animals presented which permits an estimation of the level of economic activity for each market. Market trends for the Tahoua department are monitored and analyzed in a report that is prepared and distributed on a monthly basis. Quality is ensured with regular visits to the markets and periodic review sessions to refine the weight estimation abilities of the market surveillants.

Unless the marketing service is permitted to work with livestock statistics office in the MDR and the National Livestock School, the system will likely disintegrate at the close of the project. The role of the NILP marketing data collection service at the national level needs to be more carefully specified.

**Recommendation 1:** High level commitment should be obtained to extend the NILP market system and analysis methods to the national level to ensure the continuation of the system at the end of the project. An entry level technician should be trained in micro computers and a medium level technician should be trained in data analysis as well as micro-computers. Both Nigerien cadres should be from the livestock statistics office in the MDR.

**Recommendation 2:** The marketing service should work closely with the national livestock school to develop their economics curriculum to ensure that graduates are trained in data analysis and basic statistics. If funding sources can be identified, a computer training program could also be prepared.

#### Public Health and Nutrition

The principal objectives of the public health and nutrition component, as outlined in the project paper, are to support and to expand the training of health auxiliaries from GMPs and of other health care personnel from the zone; to perform small-scale field studies on

nutrition and epidemiology; and to develop an early warning system to identify emergent health care problems.

The improvement of human health conditions in the zone, and in particular among the GMPs, promotes the overall project objective of increasing livestock productivity among pastoralists. The emphasis on GMPs also offers an unique opportunity to increase the effectiveness of the health auxiliaries. The herder cooperative provides the auxiliaries with a well-defined community that benefits from their services, making it easier for them to focus and to control their activities and providing them with a strong disincentive to quit the program.

With the 1983-84 drought, the public health section became a vital component of the project. However, health activities became crisis-oriented and were redirected away from GMPs towards the dry season gardening sites and food distribution centers. Consequently, because of the lack of progress in the GMP program and of the drought, the health component has moved ahead independently from the rest of the project activities. Its important linkages with the other components of the NILP need to be reinforced.

**Recommendation 1:** Health activities should continue on the gardening sites, in the coming months, as the sites remain the main focus of GON relief efforts. However, as herders return to the zone the health activities should progressively focus on pastoralists belonging to GMPs.

**Recommendation 2:** More consultation and cooperation should take place between the health and veterinary services in the areas of the auxiliary program, zoonosis and nutrition. To avoid confusion, similar auxiliary programs should be developed with simple, standardized management and training programs.

**Recommendation 3:** The monitoring system for health indicators in the zone should be strengthened. This should be linked to the early warning system as monitoring efforts are to be increased once a drought year is forecast. In addition, the health service should work with the early warning system to develop a preventive health strategy for the zone during drought years.

**Recommendation 4:** The regular contacts maintained at the central and departmental levels should continue and be reinforced. As a result of regular visits to nurses and health officials in the three departments of the zone, the health component has been closely integrated with the activities and responsive to the needs of the Ministry of Health at the departmental level. The regular visits to the Ministry at the national level have closely associated officials with project health interventions and have reinforced the chances of their long-term implementation and their expansion to areas outside of the zone. This has been particularly the case with the herder health auxiliary and birth attendant programs.

**Recommendation 5:** A counterpart nurse, as a doctor is not available, should be assigned to the NILP Senior Physician. This would provide the nurse with an unique opportunity to become aware of the particular health problems in the pastoral zone and would permit an expanded scope

of work for the service. This also would assure the continuity of the health activities in the NILP after the departure of the physician one year from now.

#### Animal Health and Nutrition

As elaborated in the NILP project paper the animal health and production component has three major outputs. They are " 1) introduction of an 'evolutionary operational program' for research and implementation in the GON livestock service with the participation of herders; 2) vaccine development through modern laboratory technology; and 3) support for the GON livestock service animal health program."

Efforts to develop a thermostabile rinderpest vaccine are well underway at the Plum Island Animal Disease Center. Current work includes the assessment of the thermostability of the vaccine as it is presently produced, the search for better thermostabilizers, and the assessment of the effectiveness of the rinderpest vaccine as it is now used in Niger. Long-range goals to this end at Plum Island involve the production of a genetically engineered rinderpest vaccine. This work will, however, extend beyond the life of the NILP project.

Support for the GON Livestock Service has been given in the areas of the provision of a portion of operating costs for the annual bovine vaccination campaign and in the design and construction of mobile vaccination parks. No new veterinary posts have been constructed due to administrative delays in the area of project management and Pastoral Center formation.

The NRL project was not able to produce clearly defined outputs in the area of animal health and production which, if implemented, would lead to increases in these parameters in the project zone. Several short-term consultancies were carried out, however, during this project, which were very effective in pointing the direction that NILP should take in these subject areas. Therefore, the "evolutionary operation program (EVOP)" was initiated to allow NILP to carry out research in the form of limited implementation field trials which if successful could be rapidly brought to the full implementation status as interventions supplied to the GMPs through veterinary auxiliaries. Much has been accomplished this year in this area, and the EVOP is firmly in place within the project structure. Several field trials have been and are currently being performed and some interventions are at the point of limited and/or full implementation. However, due to administrative delays during the first year of the NILP, the effectiveness of much of the technical assistance in this area was reduced. Also, a counterpart for the epidemiology and reproduction advisor has not yet been named by the GON.

In order to successfully obtain the goals of this project component the following recommendations are made:

**Recommendation 1:** A counterpart for the epidemiology and reproduction advisor be named and a second technical assistance veterinarian be immediately approved by the parties concerned. Furthermore, it is necessary that the level of technical assistance in this component remain as was agreed to in the contract between Tufts and the GON.

**Recommendation 2:** Regular contacts between the technical members of this project component and individuals at the central and departmental levels be increased in order to further acquaint and involve the Livestock Service and other Nigerien institutions such as LABOCEL and INRAN with project activities. This will help insure that project successes in this area are incorporated into the Livestock Service at the national level, becoming long-term GON innovations.

**Recommendation 3:** Collaborative efforts be initiated between the human and animal health components of the project to address important zoonotic diseases which can be cost-effectively prevented or treated. A regular dialogue be established at the national level between the appropriate services of the Ministries of Rural Development and Health.

**Recommendation 4:** Careful study be given to the program of veterinary auxiliaries and steps be taken to address the structural defects in the organization of this program which prevent it from succeeding.