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**FINAL EVALUATION**  
**THE MALI LIVESTOCK SECTOR II PROJECT**  
**(688-0218)**

**Prepared for**

**The U.S. Agency for International Development**  
**Bamako, Mali**

**by**

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**Management Specialist**

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**Veterinarian**

**REDSO/WCA Indefinite Quantity Contract**  
**No. 624-0510-I-00-9039-00**  
**Delivery Order No. 8**  
**EI No. 8806**

**August-September 1990**

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***EXPERIENCE inc.***

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*Arlington, VA 22209*  
*USA*

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## ACRONYMS

ABH	<i>Aliment HUICOMA</i> (commercial feed mix)
BNDA	<i>Banque Nationale du Developpement Agricole</i> National Agricultural Development Bank
CNRZ	<i>Centre Nationale de Recherches Zootechniques</i> National Center for Animal Science Research
CVL	Central Veterinary Laboratory
DNE	<i>Direction Nationale de l'Elevage</i> National Livestock Directorate
ECIBEV	<i>Etablissement de Credits et d'Investissement du Bétail-Viande</i> Office of Credit and Investment in Livestock/Meat
EIV	<i>Ecole des Infirmiers Vétérinaires</i>
EOPBMs	End of Project Bench Marks
FCFA	<i>Franc de la Communauté Financière Africaine</i> (cfa) West African Franc (9/1990 value \$1.00 = FCFA 265)
FN	<i>Fane de Niebe</i> (cow pea hay)
FSR	Farming Systems Research
GRM	<i>Gouvernement de la Republique du Mali</i> Government of the Republic of Mali
HUICOMA	<i>Huilerie et Cotonnerie Malienne</i> Malian Cotton Gin and Oil Extraction Plant
IER	<i>Institut d'Economie Rurale</i> Institute for Rural Economy
ILCA	International Livestock Center for Africa
INRZFH	<i>Institut National de la Recherche Zootechnique, Forestière et Hydrobiologique</i> National Institute for Animal Science, Forestry and Hydrobiology
IPR	<i>Institut Polytechnique Rural</i>
ISNAR	International Service for National Agricultural Research

JMC	Joint Management Committee
MDST	Management Development Support Team
MEE	Ministry of Environment and Livestock Production
MIS	Management Information Service
MRNE	Ministry of Natural Resources and Livestock (was changed to MEE)
NGO	Non Governmental Organization
OHV	<i>Opération Haute Vallée</i> Office for the Development of the Upper Valley of the Niger River
OMBEVI	<i>Office Malien du Bétail et de la Viande</i> Malian Office of Livestock and Meat
PP	Division of Projects and Planning (in DNE)
PIDEB	<i>Programme Intégré de Développement Economique de Bafoulabé</i> Integrated Program for Economic Development of Bafoulabe
RAC	Radio Communication System
TA	Technical Assistance
TNP	Tilemsi Natural Rock Phosphate
USAID	United States Agency for International Development

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## ANNEXES

# MALI LIVESTOCK SECTOR II FINAL EVALUATION

## EXECUTIVE SUMMARY

The Mali Livestock Sector II Project (688-0218) which began in 1982 is the third USAID/Mali livestock project and the first undertaken as part of a 20 year commitment to the improvement of incomes and well-being of livestock producers and others involved in the livestock sector in Mali. Project components were to:

- Bring about increased livestock production.
- Improve the animal health delivery system.
- Develop an integrated system using agricultural byproducts to feed animals during the dry season and to enrich the soil.
- Test and extend technical packages that increase animal nutrition
- Assist producers to implement the results of the research.

Initially the Project supported five major activities:

- 1) Management development
- 2) Credit and technical assistance for cattle fattening
- 3) Animal health
- 4) Animal production/nutrition research
- 5) Improvement of the veterinary lab and its functions

The 1986 mid-term Project evaluation concluded that the Project was making significant progress toward attaining Project goals. The cattle fattening component was dropped because of problems in its credit program. Other recommendations helped focus efforts in an extension of the Project authorized by Amendment 8 of 1988 which brought funding to \$23.2 million and extended the PACD through September 1991. A final evaluation was to be carried out in 1990 in order to assess the effectiveness of efforts after the mid term evaluation and to make recommendations for the remainder of the Project and future USAID activities in the livestock sector.

This final evaluation of the Mali Livestock Sector II Project was conducted from August 13 to October 1, 1990 by a five person team, three of whom were provided by Experience, Inc. and two under USAID/Mali Personal Services Contracts. The findings and recommendations presented in this report are a result of the team's review of the literature and Project documentation, interviews with key project personnel, livestock experts, Private Voluntary Organization (PVO) personnel, representatives of the private sector, financial and development institutions in Mali and field site visits. Field site visits were made to assess activities and accomplishments at research stations and on farms (farming systems research/extension), private and cooperative livestock enterprises, markets and slaughterhouses.

Institutions involved in the Mali Livestock Sector II Project were the Malian Ministry of Environment and Livestock Production (MEE), the National Livestock Directorate (DNE), the National Veterinary Laboratory (CVL), the National Institute for Zoologic, Forest and Hydrobiologic Research (INRZFH) and the Office of Credit and Investment for Livestock and Meat (ECIBEV).

Technical assistance financed by USAID/Mali was furnished through a PASA agreement for research scientists for the CVL, a Chief of Party, an administrative officer and a mechanic for the administrative component of the Project and an accountant for ECIBEV. Short term management advisory services were furnished under a subsequent amendment to the PASA agreement. A contract with Chemonics provided services of a Financial Director for the administrative effort and a marketing specialist for ECIBEV as well as a replacement mechanic. A Cooperative Agreement with the International Livestock Center for Africa (ILCA) provided the technical services of an agronomist and an agricultural economist with INRZFH.

Specific activities to be undertaken under Amendment 8 of 1988 were:

- The design and implementation of a disease diagnostic network in the Project area.
- Improvement of the capacity of field agents to address animal nutrition and production problems through in-country training.
- The design and implementation of a monitoring network to provide information on the natural resource use and animal health status in the Project area.
- The design and implementation of an improved distribution system for animal vaccines and medication in the Project area.
- Implementation of a forage and animal production research program in the subhumid arid zone into which livestock had moved in large number as well as continuation of promising activities in the semi-arid zone which had become a less important livestock area.
- The strengthening of extension service capacity to disseminate improved animal health and production technologies developed by the research component.
- Implementation of a financial management system for Project elements.
- Design and implementation of a management information system (MIS) to meet Ministry-wide program needs.

The final efforts of the Project were regrouped into animal health, animal production and management support elements.

The mid-term evaluation provides excellent descriptive, institutional and social background on all project components including the terminated cattle fattening activity, *Embouche Paysanne*, and as such continues to serve as a useful reference.

## **Findings**

### ***Management Support***

Implementation of the Mali Livestock Sector II Project was significantly better than that of previous livestock projects in Mali due to the introduction of the Management Development and Support Team (MDST). In the early years of the Project the MDST provided effective procurement, financial management and administrative services which allowed fairly rapid and efficient startup for the Project as a whole. Unfortunately, in an effort to facilitate this speed and efficiency, transfer of management skills and integration of improved systems were deferred. According to the mid-term evaluation, "...the institutional impact of MDST's activities were limited."

Amendment 8 directed the MDST to address the transfer of management skills and institutionalization of improved management techniques and systems. This effort was complicated and slowed partly due to the differences in bureaucratic procedure between the Malian/French system and that of the U.S. in general and AID in particular. Institutionalization proved to be more complex and time consuming than anticipated by planners. Definition of responsibilities, roles and relationships was sometimes difficult and not acceptable to the large number of institutions and personnel involved.

A Management Information System (MIS) was considered by Project designers and evaluators to be crucial for the management of the large body of information and number of activities which made up Project components. Technical assistance for the design and implementation of the MIS has been slow in arriving and it is not clear that Malians associated with the Project understand or accept the utility of such a system. An MIS Specialist is due to arrive in January 1991 for the design and implementation of the system.

A financial management system introduced into the Project has been effective and the Malian staff has been trained in its application. Procedures and related manuals for management and administration have been developed to a degree, but position descriptions and clear assignment of responsibility have not been entirely worked out. Recommended annual work plans for the three Project supported activities and standardized reporting procedures have also been neglected.

This last may have been due to the absence of a Director of Operations for the period of a year. A new Director of Operations has recently been hired and in his first months on the job has demonstrated an ability to successfully address shortcomings in organization and training.

Although it was successful in expediting Project implementation and shows potential for improving capabilities in Malian institutions, the cost of the MDST has been high. This is due in part to the employment of contract staff rather than appointment of GRM personnel to the Project as originally envisioned.

A Joint Management Committee (JMC) comprised of the heads of MEE and USAID and key managers in the Project was another special feature of the Project. JMC meetings, co-chaired by the Minister of Environment and Livestock and the USAID Mission Director, provide a forum for high level policy planning and decision making. The mid term evaluation recommended that the JMC become less involved with details of Project administration and there is some evidence that this has occurred.

### ***Animal Production***

Much useful research for the improvement of animal production has been done by the National Research Institute (INRZFH) which was supported by the Project. Varietal research for improved forage was well planned, directed and implemented. Most technical packages developed through research are in the pre-extension stage, which is to be expected given the time frame within which research and development has been done.

Supplemental feeding trials for milk cows and calves are underway in the area around Bamako to identify a profitable and culturally acceptable dairy system. Technical packages identified by the Central Animal Research facility (CNRZ) have been taught to field agents and are being extended to farmers. These include cattle feeding for market, urea treatment of rough forage for increased animal nutrition, improved small ruminant production and the production of various legumes and their usage. Some poultry raising activities have also been supported by the Project.

Improved livestock management, fodder production and storage, supplemental feedings and composting and use of manure produced by penned animals to replace purchased fertilizer form the core of farming systems which can improve farmers' incomes through more efficient use of resources. Animal health professionals, previously concerned only with disease prevention and treatment, have become increasingly interested in the promotion of animal health through improved nutrition and management practices. Agents are also promoting the planting of legumes to increase soil fertility and prevent erosion. All field agents need more extension training to increase their effectiveness in extending these improved methods and technical packages.

The cattle fattening component which was terminated early because of a poorly designed and managed loan program has had a major impact in the Project zone. Even after termination, farmers continued to obtain animals for fattening using techniques learned from the Project. Money remaining from the original loan fund was recently made available through the BNDA. Despite interest rates of about 20% per annum, the response has been greater than anticipated. Since the BNDA loans only to cooperatives, many villages are forming associations to obtain credit.

## ***Animal Health***

Through applied research several protocols were developed to control important animal diseases and these protocols are being used. Serological surveys have shown the extent of two zoonotic diseases, one of which has important implications for the development of the dairy industry.

The interaction between some of the institutions involved in the Project has improved because of the intervention of the Project. Not only has the radio network improved the ability to communicate between the field staff of DNE and the staff of CVL, but procedures for passing information have also been instituted. This has resulted in more efficient and effective work by the two institutions involved. Unfortunately, the process is slow and has not occurred between the INRZFH and the DNE.

A spirit of increased cooperation is also evidenced by the diagnostic network that allows DNE field agents to send samples directly to CVL instead of through the DNE headquarters so that samples arrive in good condition for processing. CVL has also given a series of seminars and prepared manuals for the DNE agents that assist them in making disease diagnoses and recognizing health problems. These seminars are given both in the field and at the lab. Diagnostic capabilities for the field could be increased by providing training in simple diagnosis to selected representatives of village associations.

The Project has produced research demonstrating a relatively easy method to reduce the tsetse fly population by almost 99%. Treatment regimens for bovine trypanosomiasis, the agent of sleeping sickness carried by the tsetse fly, have been developed for different ecological zones and are being used. Death loss of cattle has markedly decreased in areas where the programs are in effect.

Research done by the Central Veterinary Laboratory (CVL) has compared the economic value of anthelmintic treatments available to the producer and is developing treatment strategies that take advantage of parasites' life cycles to control them. Since producers have readily accepted trypanosomiasis treatment, it is likely they will accept anthelmintic treatment schemes. In the area of public health, the CVL has discovered that the rate of brucellosis infection is high among cattle which provide milk to urban centers. The microbiology section at CVL has expanded to test for drinking water contamination and safety of processed foods.

The CVL produces vaccines in increasing quantities and is able to effectively test for quality. It is exploring the potential for local production of more types of vaccines which would result in lower cost, more reliable product for the local market and could be an important source of export income as the lab attempts to become self supporting. Local production of poultry vaccines is also being developed to assure protection from local strains of New Castle virus and to utilize excess lab capacity. The vaccine research and production effort is hindered by lack of pathogen free eggs and old or damaged equipment.

Extension methods training for DNE and CVL personnel is improving, but is still insufficient. Transportation for animal health people in the field continues to be problematic. A molyette purchase credit scheme has not been very efficiently run and fuel allotments have not been adequate to allow agents to cover territory assigned to them.

### ***Crosscutting Issues***

#### ***Women and Animal Health and Production.***

Although women play an important role in agriculture, there has been little effort expended under the Project to promote their interests and participation in the livestock sector. Some women have received training and two of seven section heads at the CVL are headed by women. There are also some women, 35 of 387, who work in the field for DNE, but none are in a position of responsibility.

Women could benefit by extension assistance with small ruminant fattening and poultry raising since they are most often involved in these activities. Female extension agents would be more effective than male agents in extending improved practices and technology to women farmers.

#### ***Animal Improvement.***

The Project omitted livestock improvement in the design stage. Although improved health and nutrition must be achieved before animals can fulfill their genetic potential, some thought needs to be given to developing attainable characteristics and performance standards in domestic cattle as animal improvement occurs over a long time frame.

### **Conclusions**

#### ***Management Support***

The MDST has been a useful component to the Livestock Sector Project, particularly in the areas of financial management and implementation. Technology transfer was neglected in favor of rapid implementation in the early years, but the MDST was also able to train its own employees in procurement, financial management, logistic support, and to a degree, monitoring and evaluation. It also served as a conduit for the AID point of view on specific issues. Cost of the MDST is high due in part to the use of contract employees rather than GRM civil servants as originally planned. However, considering confusion and wasted effort in previous livestock projects due to lack of effective management, the MDST may be cost effective in the long run. The current Director of Operations has vigorously

pursued both the letter and the spirit of the MDST mandate in his first few months on the job. That he was able to bring DNE and CVL employees into the MDST for training demonstrates that a certain level of competence has been achieved and that original prospects as to the usefulness of the MDST were not overly optimistic.

### ***Animal Production***

Time allotted to development and extension of research was not long enough, but the animal production component of the Project fulfilled its terms of reference if one adjusts the logframe to read "pre-extended" rather than "extended" in reference to improved forage packages. Not enough attention was paid to small ruminant and poultry research and improvement which could benefit more people than the same type of activities for livestock. Farmers are adopting practices such as composting manure for use as fertilizer and supplemental feeding of livestock, long promoted by the DNE, and are combining them in integrated farming operations. It is not possible to attribute successes to Project inputs alone, but Project support was important in the overall effort and significant improvements in farming practices probably would not have occurred without sustained Project support.

### ***Animal Health***

The CVL has developed into a useful and effective diagnostic and research facility with vaccine production capabilities which may be able, at least in part, to support laboratory operations. Communication and collaboration with the DNE is beginning to occur. Continuing education programs and manuals for DNE field staff are in preparation and training sessions for DNE field agents have been conducted. A cold chain was put in place and functions well. Vaccines are being supplied to the field in increasing amounts and export possibilities for vaccines are being explored. Percentage of the Malian national herd vaccinated over the past few years has increased significantly. More effective systems for facilitating diagnoses have been put in place and other measures for creating local capability for diagnosis are being considered. CVL personnel are creating linkages with other services and donors at the field level but communication and coordination at a higher level have not yet occurred. Not enough attention is given to small ruminant and poultry health research, an improvement which would benefit more people than the predominant cattle research currently conducted. Obtaining appropriate and useful equipment and supplies when they are needed has been a continuing problem with this component.

## ***Crosscutting Issues***

Transportation in the field to do applied research and carry out extension responsibilities has been problematic throughout the Project. Field agents and researchers are sometimes not able to fulfill their responsibilities due to lack of vehicles or fuel. Not enough emphasis has been put on involving women in either decision making positions in the various institutions involved or women producers in rural areas. Several areas for privatization have been identified within Project components. Chief among these are the vaccine production capabilities being developed by the CVL and local seed production.

## **Recommendations**

### ***Management Support***

Future project activities in the livestock sector will require the same type of management support including planning, procurement, financial management, logistic support and monitoring and evaluation services required by the Mali Livestock Sector II Project and currently furnished by the MDST. Policies and procedures continue to be worked out within the MDST and the component has become increasingly competent through the LOP. Management performance has been superior to that in previous livestock projects and for this reason the MDST concept should be included as part of future livestock sector projects. If cost of the MDST becomes an overriding concern, a systematic comparison could be made of wasted efforts and inefficiencies which were far more numerous in a situation without MDST than in Mali Livestock Sector II.

The GRM, and the MEE in particular, should be encouraged, supported and assisted by the MDST in finding ways to identify and operationalize training opportunities and adoption of improved management systems used within the MDST, including the MIS. Planned MIS design and installation should be supported and expedited and a continuing training program in its usefulness and use set up. A Director of Operations experienced in management and MIS use should be included in any future project and a Malian counterpart should be identified. Phase out of expatriate assistance should be planned in collaboration with MDST staff. Job descriptions and lines of communication and authority should be identified and developed. A system of incentives for performance should be instituted.

Opportunities for MDST to act as the locus of policy discussion, debate and formulation should be explored.

### ***Animal Production***

More emphasis should be put on the development of small ruminant and poultry research and extension components. Long range livestock improvement efforts should be included in any future plans for the livestock sector. The use of local strains of legumes to improve soil and as producers of forage should be explored and developed. Fertilizer tests should continue as should feeding trials. Extension agent training should be a priority and cost effective programs for doing so, such as the intensive training of a training unit to hold courses and seminars in-country should be explored. Potential for a private sector local seed industry should be explored.

### ***Animal Health***

Diseases which cause significant animal loss should be identified and mapped. Work with small ruminants and poultry should be a priority. Animal health professionals should be sensitized to and educated in production problems and issues. Field agent extension training should be expanded and improved. Incentives and opportunities for field agents who introduce and maintain effective extension programs should be created. More applied animal health and vaccine research should be done, preferably in collaboration with other projects, donors and the private sector. Reference material to keep lab and field personnel up to date in their specializations should be acquired, preferably in a national agricultural research library.

### ***Crosscutting Issues***

Activities with potential for privatization should be identified by each component of the Project. Privatization of veterinary services and pharmaceutical supply should be supported within a future project, through other types of development assistance or both, depending on agenda, budget and policy of USAID/Mali. Village associations should be supported and encouraged to develop linkages and relationships with national institutions engaged in livestock sector activities. Transportation problems should be studied and addressed.

Radio diffusion of information on animal health, improved cropping techniques and government and private services available as well as market information should be developed. Land tenure, marketing, taxation and resource allocation policy issues must be confronted and addressed by the GRM. USAID/Mali should encourage, support and assist the government in these efforts.

## FINAL EVALUATION

### MALI LIVESTOCK SECTOR II PROJECT (688-0218)

#### INTRODUCTION

##### *Background*

Livestock is important to Mali economically and culturally. Mali is second only to Nigeria in West Africa as a producer of meat. The Mali livestock sector generates approximately 50 percent of export earnings and accounts for approximately 20 percent of GNP. Livestock serve as a source of income and a reserve for savings, a tangible measure of status and of security for the extended family. Livestock play an integral part in celebrations and in bereavement, ease labor constraints and provide important materials for useful and decorative household articles.

Despite the importance of the livestock sector to Mali, it was characterized by a low level of management and inputs, high animal mortality rates and serious animal health problems, political and financial constraints to government investment and general lack of incentives and resources to improve productivity. The drought of 1969-74 and related forced sales resulted in the loss of an estimated 30 percent of the national herd. Shifting markets and changing government policies engendered a crisis in the Mali livestock sector.

USAID/Mali responded to livestock sector problems with a series of projects designed to address animal health, management, production and marketing problems. The first of these projects, Mali Livestock Development, provided credit for animal purchase and introduced controlled grazing and feedlots. The second, Mali Livestock Sector, introduced range management and new water points as well as tsetse-fly control and vaccinations to permit use of new pasture land.

The Grant Agreement for the Mali Livestock Sector II Project, the third USAID/Mali livestock project, was signed in 1982 for \$17.5 million over five years. Subsequent amendments brought total funding to \$23.2 million and extended the PACD to 1991. The USAID/Government of the Republic of Mali (GRM) agreement was seen as the first phase of a 20-year collaborative effort to bring about sustained improvements in the income and well-being of livestock producers and others dependent on the livestock sector.

The purpose of the Project is to:

- Expand activities that have brought about increased production.
- Continue testing activities that show potential.
- Identify improved technologies for extension through on-farm research.
- Develop the institutional capacity of the public and private sectors to identify, plan and evaluate viable livestock sector investments.

### ***Institutions Involved***

***MEE.*** The GRM Ministry of Environment and Livestock Production.

***DNE.*** The National Livestock Directorate responsible for the delivery of inputs to maintain the health and productivity of the national livestock herd, including vaccinations, treatment and extension.

***CVL.*** The National Veterinary Laboratory which performs diagnoses and animal health research. A separate CVL unit is responsible for vaccine research and production.

***INRZFH.*** The National Institute for Zoologic, Forest and Hydrobiologic Research, the Malian entity responsible for the research of physical constraints to animal productivity. Serves as the source of extension information for the DNE.

***ECIBEV.*** The Office of Credit and Investment for Livestock and Meat, the agency responsible for credit and marketing in the livestock sector.

### ***Project Activities***

Initially the Mali Livestock Sector II Project supported five activities:

- Project management and management development in the GRM through the Management Development Support Team (MDST).
- A Cattle Feeding Credit Program (ECIBEV).
- Infrastructure and equipment support for improved cattle health activities of the DNE.
- Research on forage production, animal nutrition and related socio-economic factors by INRZFH.
- Improved vaccine quality control, improved diagnostic capability, increased capacity to perform applied animal health research, lab construction, farm renovation and equipment support to the CVL.

### ***Project Implementation***

USAID/Mali provided financing for technical assistance, training, construction, commodities and other local costs. Technical assistance was provided for by:

PASA Agreement No. IML-0201-P-AG-3066 signed in 1983 to provide four research scientists for the CVL, a Chief of Party, an administrative officer and a mechanic for the MDST and an accountant for ECIBEV.

PASA Amendment No. IML-0218-P-AG-3066 for a series of short term visits to improve management practices and systems.

Chemonics Contract No. 688-0218-C-00-3001 signed in 1983 and Chemonics Contract No. 588-0218-C-00-5057 signed in 1985 to provide the services of a Financial Director for MDST and a marketing specialist for ECIBEV and a replacement mechanic for MDST.

A Cooperative Agreement with the International Livestock Center for Africa (ILCA) for technical services of an agronomist and an agricultural economist with INRZFH.

### ***Project Evaluations***

Three formal project evaluations have been conducted, two internal and one external. The two internal evaluations were conducted in 1986 and 1988 by OMBEVI. The external (mid-term) evaluation was conducted in 1986 by the Institute for Development Anthropology.

The mid-term external evaluation concluded that the Project investment had the potential to make a sound contribution to the Malian economy as well as to individual livestock owners and that it had made significant progress toward attainment of Project objectives. The evaluation team recommended Project continuation with necessary mid-course corrections.

### ***Project Extension***

Based on evaluation recommendations, Project results and GRM, Project personnel and Mission dialogue, Project Amendment 8 authorized the final Project extension through September 1991 and a \$five million funding increase which brought funding to the \$23.2 million figure. Amendment 8 focused on specific activities and actions to be carried out before PACD.

Specifically, the entities involved were to:

- Design and implement a disease diagnostic network in Regions I and II and the District of Bamako. (DNE/CVL)
- Improve the capacity of field agents through in-country training seminars to address animal nutrition and production problems. (DNE/CVL/INRZFH)
- Design and implement a monitoring network to provide reliable, accurate and timely information on the disease status and on the status and use of natural resources in pastoral areas in Regions I and II and the District of Bamako. (DNE/CVL/MDST)
- Design and implement an improved system for the distribution of vaccines and medications in the Project zone. (DNE/CVL/DNPV)
- Implement a forage and animal production research program in the sub-humid arid zone, while continuing promising activities in the semi-arid zone. (DNE/INRZFH)
- Strengthen the capacity of the extension service to disseminate improved animal health and production technologies by improving integration of field and research services. (DNE/INRZFH/CVL)
- Implement a program/financial management system for Project elements. (MDST/MEE)
- Implement a management information system (MIS) which will meet Ministry-wide program needs. (MDST/MEE)

In addition, the on-farm cattle feeding component was dropped as recommended by the mid-term evaluation and USAID auditors, due to management problems with the credit fund associated with the activity. Project activities were regrouped into animal health, animal production and management support elements and the logical framework was revised in light of this reorientation, although the Project goal and purpose statements were not altered.

## ***The Final Evaluation***

The Project Paper and Project Agreement call for a final evaluation to be carried out in 1990. Although the PACD was a year away, it was considered useful to conduct this assessment prior to the active planning and design for a follow-on project. The evaluation was conducted in August and September of 1990. Under a REDSO/WCA Indefinite Quantity Contract, Experience, Inc. provided three members of an evaluation team, which was filled out by two additional members under Personal Services Contracts with USAID/Mali.

The team was made up of:

Warren Putman, Livestock Specialist/Team Leader (EI)  
Daniel Miller, Veterinarian (EI)  
Norman Ulsaker, Agricultural Economist (EI)  
Francois Doamekpor, Financial Management Specialist (PSC)  
Moussa Coulibaly, Veterinarian and Malian private consultant (PSC)

The purpose of the evaluation was to assess Project activities since the mid-term evaluation in 1986 (See Statement of Work, Annex I). The team was to evaluate the Project and make recommendations to USAID/Mali and the MEE with regard to:

- 1) Progress made toward attaining Project purpose and goal.
- 2) Identification and analysis of problem areas or constraints that may have inhibited attainment of the Project purpose.
- 3) Evaluation, to the extent possible, of the overall development impact of the Project.
- 4) Recommendation of sound areas of investment, especially within the livestock sector, in areas of animal health, production and management.

The team was to examine Project activities and progress in four areas: 1) The overall feasibility, effectiveness and validity of the Project implementation arrangements as described in the Project Paper Supplement (Amendment 8). 2) An assessment of Project implementation, performance and progress within the four Project supported activities (MDST, DNE, CVL and INRZFH). 3) Other Project issues. 4) An assessment of unplanned effects and lessons learned.

The examination of Project activities and progress was to concentrate upon the time period following the mid-term evaluation in 1986 to the present.

The findings and recommendations presented in this report are a result of the team's review of literature and Project documentation; interviews with key Project personnel, livestock experts, PVOs, representatives of the private sector, financial and development institutions in Mali; and field site visits.

Site visits were made to assess activities and accomplishments at research stations and on farms, private and cooperative livestock enterprises, markets and abattoirs. Questionnaires were distributed to long term and short term participants (questionnaires in Annex II). Six participants completed these and returned them to the team.

A draft report was prepared and submitted to USAID/Mali and MEE September 21, 1990. Comments on this draft were received and a briefing given to USAID and the MEE on September 28. The team departed Mali on October 1, 1990.

As the mid-term evaluation report is of profound breadth and depth in its descriptive analysis for each of the Project components and the Project as a whole and is particularly strong in social and institutional analysis, that report should be referred to for more detail. The cattle fattening (*embouche paysan*) component for which funding was terminated is also described extensively in the mid-term report.

## **PROJECT IMPLEMENTATION**

### ***The Validity of Project Goal and Purpose***

The goal of the Mali Livestock Sector II Project was not altered by Amendment 8 and remains "to bring about sustained improvements in the incomes and well-being of producers and others dependent on the livestock sector." In this first phase of a 20 year collaborative effort by the Government of Mali (GRM) and USAID/Mali, a project approach was employed to foster improvement in institutional capability, livestock health and productivity and in management capacity with a view to expanding successes throughout the sector which would lead to improved incomes and well-being. Identification of these areas and related activities as the focus of the Project was based on USAID experience in the livestock sector, dialogue with the GRM and subsequent evaluation which indicated both a compelling need and demonstrated potential for goal achievement.

The 20 year commitment indicates an appreciation that the Project goal will not be reached immediately and that intermediate goals must be set and achieved such that their benefits coalesce in the achievement of improved incomes and well-being in the livestock sector. The mid-term Project evaluation in 1986 concluded that measurable progress had been made in each area of Project concentration, i.e. organization/management, animal health and animal productivity. The final evaluation team concludes that although Project activities to date have yet to substantially increase incomes in the livestock sector, significant progress has been made in creating the requisite conditions to make this possible. This section reviews goals set in each area of Project activity (management support, animal health, animal production), the relationship between inputs and outputs in goal achievement and the adequacy of outputs to achievement of purpose in each.

### ***Validity of Linkages Between Inputs and Outputs***

#### ***Management Support and Research and Extension.***

Technical assistance, training and other Project supplied resources were to result in improved management of Project activities. This in turn was to result in improved performance of all Project activities. The success of this process depends on a series of assumptions including:

- MEE and producers perceive benefit from and can implement improved practices.
- Adaptive technical and institutional progress will result in improved and sustainable livestock production and profit.
- GRM can increasingly assume recurrent costs and sustain support of animal health interventions.

- MEE and AID effectively use Project resources.
- Technical assistance is effective, capable GRM counterparts are assigned.
- Appropriate cost effective systems can be developed, demonstrated, and extended to producers.

Most of these assumptions are valid, but circumstances do exist when they do not apply. For instance, MEE and producers may appreciate the benefit of planting a particular forage crop, but the producer may not be able to try it because available labor is dedicated to priority cereal crops at the time the forage should be planted. The assumption that GRM can increasingly assume recurrent costs is as much a political question as an economic one. To assume recurrent costs for animal health means that these resources cannot be spent elsewhere. Measures recently taken to privatize veterinary services and to produce and market veterinary pharmaceuticals may serve to reduce public sector obligation for support in these areas. Procurement of supplies by the different divisions has been a continuing difficulty because of bureaucratic practices that may be designed to increase effectiveness and insure accountability, but in practice handicap implementation. Even when addressed by well-qualified, knowledgeable personnel, the paperwork involved requires an inordinate amount of time and effort. The final two assumptions regarding effective technical assistance and counterparts have proven to be valid. On occasion technical assistance could have been better, but this was rare.

Successful implementation of this Project makes further assumptions including:

- The availability of qualified technicians willing to work in the Malian environment.
- The availability of qualified trainees.
- The absence of abnormal procurement delays.
- The absence of abnormal construction delays.
- Effective, timely and relevant technical assistance.
- The availability of Malian counterparts.
- The ability of trainees to apply newly acquired knowledge and skills.
- Cooperation across Project activities and Ministry of Environment and Livestock Production (MEE) department lines as well as cooperation with other agencies and institutions involved.

As a whole, these assumptions are not entirely realistic. In the Malian environment the number of educated candidates who are qualified for advanced training is still limited as is the number of qualified counterparts. Trained and educated personnel are sometimes placed in slots that require professionals but are not necessarily related to the participants' fields of study. Skills acquired in a U.S. university setting take time and experience to apply in the Malian situation. Limited resources means competition for them among individuals and institutions and the professional jealousies which can result. Climatic extremes and lack of infrastructure and amenities render recruitment of qualified and dedicated expatriate professionals difficult and time consuming.

Thus, assumptions on which Project plans were made were often more conditions which would be desirable rather than the real situation in Mali. However, making these assumptions allowed observers and evaluators to identify areas of further need and gave planners a place from which to begin improvement of institutions and policy and to place investments.

### *Linkages.*

Project design attempted to make logical connections between institutions and activities necessary to improve incomes and well-being of livestock producers and those dependent on and involved in the livestock sector. Investment was made in facilities, technical assistance, equipment and education to improve capacity to identify and address animal health and production constraints.

Recognizing the constraints placed on previous livestock projects by implementation problems, specific emphasis was put on improving management capability. The Management Development and Support Team (MDST) was created to address administrative and management constraints to implementation. Expatriate MDST personnel were to work with personnel from the GRM departments and institutions involved in the Project.

Coordination of Project activities within DNE was assigned to the Division of Projects and Planning which is at the same administrative level as the Divisions of Range Management and Pastoral Waters, Animal Production and Animal Health. Division heads within DNE were reluctant to take direction from the Director of Projects and Planning whom they did not see as having authority over their areas of responsibility. As a result they ignored directives from Projects and Planning. Cooperation could be improved by assigning coordination to a higher level of authority and increasing the authority of Projects and Planning by designating it the counterpart of the Management Development Support Team (MDST). In this way the division could *gradually* assume MDST functions and authority in the vital area of activity coordination.

Despite some constraints, linkages between livestock-related research and extension activities within the Project regions and the District of Bamako are much stronger than the national norm because of USAID/GRM activities. There is also collaboration at the field level between Project components, farmers and livestock producers. The further one moves away from areas of Project activity, the weaker linkages between research and field activities become.

Areas for improved linkage and more effective management have been identified. Although systems are in place for improving extension of research results, they are not yet being used effectively. Rather than follow the prescribed process which includes the involvement of intermediate levels within the National Livestock Institute (DNE), Research

Institute (INRZFH) researchers go directly to the field extension agents to test their results. Although this is successful in the pre-extension phases, sound and broad based extension depends on improved collaboration.

Currently the majority of Project research material is in the pre-extension stage. Some extension is now being done and the transition from pre-extension to extension package will be more rapid as the Project nears completion. It would be a serious error for the Project to extend anything other than a fully tested and proven technical package. Benchmarks and schedules for research must take into consideration the time required to complete the entire research-extension cycle in order to make the linkages required by the Project.

For what were considered justifiable reasons, animal improvement was left out of the Project design. The final evaluation team considers this to have been a short sighted decision as animal improvement is a vital link in the effort to improve production and productivity.

## **Validity of End of Project (EOP) Benchmarks and Progress toward Meeting Them**

### ***Animal Health***

Benchmarks were established for Project objectives relating to the establishment of a diagnostic network, the implementation of an effective animal health campaign, the measurement of progress toward vaccine quality control and establishment of a serosurveillance program and animal extension. The validity of these are discussed below.

#### ***Benchmarks for the Establishment of a Diagnostic Network.***

- 75 percent of disease outbreaks confirmed.
- 50 percent of all treatments are a result of confirmed diagnoses.
- 60 percent of all samples sent to CVL are diagnosed.

It is reasonable and attainable to diagnose 75 percent of outbreaks of major proportions. However, it is not at all realistic to expect 50 percent of all treatments made to result from a confirmed diagnosis. In the U.S. where communications are much more rapid than in Mali, at least two days are required to send a sample to a lab and to receive a diagnosis in reply. This is far too long to wait for treatment to begin. Also, because a veterinarian sends samples only for those cases he/she is unsure of, it is probable that samples are sent in fewer than 10 percent of all cases. It is untenable to hold Mali to a higher standard than the U.S.

It is an attainable and a reasonable goal that 60 percent of samples sent to CVL be diagnosed, but accuracy of diagnosis should also be considered. Since there is no good way

to measure the accuracy of the results, assurance of accuracy can be increased only by continued advancement in training and techniques.

***The Benchmark for the Implementation of an Effective Animal Health Campaign.***

- 50 percent reduction in outbreaks compared to nonproject zones.

This benchmark is problematic in its assumption that the USAID Project is the only effort to improve animal health in Mali. All of Mali is covered by another project, the Pan African Rinderpest Campaign (PARC), that has been responsible for instituting a program similar to that in the USAID Project zone. Using financing from other projects, PARC has seen to it that a cold chain and radio network has been installed in every region. Further, differences among the regions in livestock management systems and practices and climatic conditions are so great as to overshadow any differences caused by vaccination. A more appropriate benchmark might be the comparison of number of outbreaks in recent years with years previous to Project intervention, although drought effects might have influenced disease levels. The question is somewhat moot since there is a lack of accurate data with which to make the comparison. For example, in 1988 only 14 outbreaks of bovine pasteurellosis were recorded for the entire country among roughly 5,000,000 cattle. These data are not credible.

***Benchmarks for Vaccine Quality Control and Serosurveillance Program Establishment.***

- 90 percent of all vaccines produced are of acceptable quality.
- 100 percent of vaccine lots tested by CVL.
- 50 percent of all cattle in Project zone are immunized.

All of these benchmarks are reasonable and achievable. Furthermore, they are a good measure of attainment of the objective.

***Benchmarks for Animal Extension.***

- 50 percent increase over 1985 in vaccination of small ruminants.
- 50 percent increase in sales over 1987 of preventive medicines.

The term "preventive medicines" is taken to mean antiparasitics such as antitrypanosomal drugs and anthelmintic. It is difficult to make a connection between the benchmarks and the objective. Improved extension services as it relates to improved animal health would result in an increase in activities that extend practices identified by research to result in improved animal health. Often these practices do not have obvious value or producers would not adopt them immediately even given the opportunity to do so and effective extension programs are needed to introduce and encourage their adoption. Vaccination is a technique widely used by cattle producers. Veterinary drugs have long been sought by producers and only since the advent of the Malian Veterinary Pharmacy

have they been readily available. Indeed, one can make the argument that good extension might reduce the need for drugs.

A more applicable benchmark would be to count the number of new technical packages extended and the number of livestock owners which have accepted each. For animal health, a useful benchmark would be the increase in samples sent to the diagnostic lab.

No benchmarks were established to measure compliance with the objective concerning the research program in animal health. Areas that should be of concern are the confirmation of existence and distribution of important animal diseases, followed by a determination of epidemiology. From that, control programs to be tested and extended to producers could be developed. Ancillary to this would be the development of vaccines and vector distribution and control studies.

No benchmarks were given for control of recurrent costs. There is to be an in depth study of CVL costs in the near future.

### ***Management Support***

#### ***Counterpart Training Benchmarks.***

- Six Malian counterparts trained to form a qualified multidisciplinary training and consulting team including management, accounting, marketing, animal husbandry, extension and training fields.

A number of Malians have been trained under the Project, some in the U.S. and others in Mali and third countries. Adequately trained personnel in the areas of accounting, marketing and training skills remain scarce in the presence of considerable demand. Participants would be better referred to as "staff" rather than team as these people have been dispersed throughout the various Project supported activities and related institutions.

#### ***Management System Benchmarks.***

- Design and installation of a Management Information System (MIS) to track physical and technical performance and progress of Project.
- Improved financial planning/management.
- Tracking and management of commodities from point of arrival to end use and the establishment of regulations for commodity use and maintenance.

The MIS has not been developed as planned. According to the former Director of Operations, MIS "had the clearest mandate for integration, yet was the least understood and received the least support of any of the activities." Present plans call for a contract for an

MIS specialist for 6 months in country. A prototype MIS is to be established for animal health and will serve as a model for extension to other divisions and activities.

In general, financial activities have been well managed. Financial information generated by MDST is accurate, useful, and has assisted in management decisions. However, the improved financial management systems have not been integrated into the MEE and divisions.

The MDST developed and maintains an effective method for procuring and controlling inventory. Proper procedures were followed in most of the cases and adequate documentation supports all transactions.

***Establishment of Standard Operational Procedures Benchmarks.***

Procedures and manuals were to be developed for:

- Local and international procurement.
- Vehicle and equipment use, operation and maintenance.
- Liaison with procurement agents in the U.S.
- PIO preparation and arrangements for their expeditious review, modification and approval by GRM and USAID.
- Arrangements for clearance of commodities through customs.
- Obtaining licenses, visas and vehicle registration.
- Logistical support to JMC

A manual covering procurement and commodity management is in the process of revision and updating. A regular vehicle maintenance and servicing schedule has been established such that vehicles are lubricated, oil and filters changed, brakes adjusted and other serviced performed every 3000 kilometers.

***Spare Parts and Maintenance Benchmarks.***

- Establishment of maintenance and spare parts center and sub-centers.

A garage was established and performs maintenance and repairs on all Project vehicles. Spare parts are also in stock. No sub-centers have been established, although MDST has tentative plans to establish one in Kai or use a private garage for vehicle maintenance.

### ***Work Plan Benchmarks.***

- Development of an integrated program and financial work plan
- Development of a master work plan for MIS to enable each division to plan, monitor and evaluate its Project supported activities and provide MEE with information to make objective economic assessment of resource allocation.

Evidence shows that the Project has managed its financial activities well. Financial information generated by the MDST is accurate and useful and has assisted in management decisions. The MIS has yet to be developed.

### ***Animal Production***

In general, EOPBs for extension were overly ambitious for a project which combines livestock research, forage crop and range management research and farming systems research. The cycle of a research activity, from identification through planning, implementation, data collection and analysis, field testing and extension requires many years. If the planning stage is completed after on-set of the rains and it is too late to plant, research will be delayed for a full year. It is often two to four years before results are considered reliable. Research data must be analyzed, published and discussed at the planning level and approved for farm testing. This process can take several years. Extension agents must be convinced of the package's validity and trained in its use before extension begins. A package with several components may require farmer training.

### ***Benchmarks for the Development of Technical Packages for Nutritive Livestock Forage.***

- Identify five new legume varieties and prepare extension packages for them.
- Induce 100 producers to adopt technical packages
- Identify five new forage species and develop extension packages for and extend two of these.
- Induce 50 producers to adopt new forage packages.

In the semi arid zones seven rather than five legume varieties were identified and two rather than five varieties were extended as planned. Four new varieties were pre-extended. INRZFH reported that 50 producers adopted legume packages. In the sub humid zone, five new forage species were identified and two packages pre-extended. INRZFH reports that 25 rather than 50 producers adopted new packages.

### ***Improvement of Animal Nutrition Benchmarks.***

- Identify five improved rations for small ruminants and extend three nutritional packages in the semi arid zone.
- Induce 50 producers to adopt the packages.
- Identify three improved rations for draft animals and extend two technical packages to producers in the semi arid zone.
- Identify 20 improved rations and/or legumes and prepare nine improved ration packages for extension.
- Induce 300 producers to adopt improved rations and/or legumes.
- Train 100 DNE and OHV agents to implement natural resource management techniques using legume varieties.

For small ruminants, seven rather than five improved rations were identified and three nutritional packages were pre-extended rather than extended. INRZFH reports 36 rather than 50 producers trying the packages. For draft animals, objectives were met or exceeded. Five rather than three improved rations were identified and as planned, two technical packages were extended. INRZFH reports show 70 rather than 100 producers adopting the packages. The logframe outputs were exceeded in some cases and partially met in others. For example, 24 rather than 20 improved rations or legumes were identified. It was expected that nine improved rations or legumes would be extended. In actuality, four were extended and eight were pre-extended. One hundred eighty-one farmers were trying the new technologies as opposed to 300 adopting them. With regards to natural resources, 95 rather than 100 DNE and OHV agents were trained to implement natural resource management techniques by June 1990.

Technical packages introduced have demonstrated the value of legumes used in crop rotations to build soil fertility, reduce erosion and control weeds. To a lesser extent, tree legumes are being used as wind breaks, to conserve soil and moisture and provide forage.

- Facilitate the integration of agriculture and livestock by improving applied animal production research and strengthening the animal production extension service to more effectively disseminate appropriate technical packages to producers.

The livestock extension service is almost entirely staffed with people who were trained in animal health and disease control. For years this has been the only function of the service. Now DNE has re-directed focus on animal production and management. DNE and INRZFH are conducting seminars which instruct agents in the use of technical packages. However, the entire service needs training in animal production, management and extension methods.

## **Project Performance, Implementation and Progress within Supported Activities**

### ***Project Organization and Performance of Decision Makers***

#### ***USAID and MEE.***

USAID essentially turned over day to day management to MDST once the Project became fully functional. Major Mission involvement at present is responsibility for and participation in the JMC and more recently the Restricted Committee (RC). The USAID Project Officer and local staff also closely monitor field activities and management. During the absence of a Director of Operations, USAID greatly increased its involvement in the activities of the Project.

The Mission encountered some problems resulting from the contractual relationship linking USAID, INRZFH, and ILCA. As reported in the mid-term report, the three parties are linked by two contracts which originally did not clearly specify the roles and responsibilities of the various parties. The major problem resulted from uncertainty and confusion between ILCA and INRZFH over control of USAID funds. These were sent to INRZFH to be channeled to ILCA. Control of these funds became a source of conflict between ILCA and INRZFH. An interim compromise was the establishment of a separate account to be jointly managed by the team leader of the ILCA technical assistance team and INRZFH. Under this arrangement a great deal of the team leader's time was spent on administration. As a final compromise, the contract was amended and control of operating funds transferred to INRZFH.

USAID made a major decision following the mid-term evaluation to terminate the Cattle Feeding (Embouche Paysanne) component of the Project. (See discussion of this component in Annex III.)

#### ***USDA and Chemonics.***

USDA/OICD played a major role early in the Project and continued to supply the services of the Director of Operations at MDST until October, 1989. USDA experienced great difficulty in recruitment of qualified technicians, which resulted in delays in implementation. The difficulty experienced was in part due to internal USDA regulations.

OICD provided action training in management skills by technicians from the Development Project Management Center (DPMC). Its role was never clear and the scope of work covered many of the same duties as the MDST Director of Operations and the Director of Administration.

Chemonics provided three specialists under long-term contracts: a financial management specialist (55 months), a mechanic (20 months) and a livestock credit and marketing specialist (8 months). They also provided short-term assistance in garage

management (5 months), management information systems (7 months) and vaccine production (1 month).

Chemonics was able to establish a working financial management system within MDST. It also developed a well-run and managed vehicle maintenance center. These accomplishments aided Project performance significantly.

Chemonics encountered problems in institution building within the MEE, especially with the financial management system and the MIS. In its final report Chemonics speculated that one cause of shortcomings may be "a deficit of vision and leadership on the part of the various parties (the technical assistance team, the Ministry and USAID) at various times. The fact that several technical assistance contractors were involved in implementing the Project may have made it harder for one contractor to take responsibility for achieving consensus and producing a clear mandate and plan for institution building." They also cited the problem of AID's temporarily delegating too much responsibility for oversight of AID funds to the MDST staff. Finally, they cited the desire on the part of the GRM to select from several possible candidates for each job rather than to accept or reject just one. Chemonics also considered that the GRM set unrealistically high standards for candidates. There were also complaints of delays in receipt of supply orders.

## **PROGRESS MADE TOWARD REALIZATION OF OUTPUTS AND PURPOSE**

### **MANAGEMENT SUPPORT**

Two special structures were established at the start of the Project to avoid management problems which had handicapped earlier livestock projects in Mali. These were the Joint Management Committee (JMC) and the Management Development and Support Team (MDST).

The JMC is the primary instrument through which joint USAID/GRM high-level policy and program guidance and coordination is provided. It is made up of the heads of the MEE and USAID and key managers in the Project. JMC meetings are co-chaired by the Minister of Environment and Livestock and the USAID Mission Director. The JMC presently meets annually, although it met biannually earlier in the Project.

The JMC provides a forum for high-level policy planning and decision-making. However, it was reported in prior evaluations that JMC meetings often become involved in details of Project administration that could be better attended to at lower administrative levels. JMC has effectively become the decision-making body for the Project.

The MDST is responsible for Project implementation activities such as budget preparation, financial management, local procurement, local contracts, training, vehicle maintenance and control, fuel control, inventory systems, clearances of annual workplans, preparation of JMC documents and minutes and quarterly progress reports. It serves as the main liaison among the various organizations involved in the Project and serves as a conduit for the views of USAID/Mali. Although it has no technical or administrative authority over agency directions, it is required to review and approve operational and financial plans and reports prior to their submission.

The MDST has carried out its administrative responsibilities reasonably well. The expatriate Director of Operations who completed his contract in 1985 concluded that counterpart staff had been fully trained and capable to carry out administrative duties.

The MDST serves as secretariat for the JMC, keeping minutes and preparing reports on meetings. It has also been effective in local contracting, procurement, clearance at customs and obtaining vehicle registration and licenses. Problems with administration have often been due to either USAID or GRM bureaucratic policies and regulations.

A restricted committee (RC) was formed at the end of 1989 upon the departure the Director of Operations. The RC is made up of the managers and directors involved on a day to day basis with the functioning of the Project and who essentially assumed the duties of the Director of Operations. This committee became key focus for interdepartmental

coordination, program and budget planning, quarterly meetings and the JMC. The RC includes two Cabinet representatives, a representative from each of the three departments (CVL, DNE and INRZFH) and two representatives from the USAID agriculture office. Initially the committee met every two weeks. At the time of the final evaluation, September, 1990, it is not certain whether the RC will continue at its previous level of activity, given the assignment of a new Directing Officer.

Management support activities during the earlier years of the Project provided effective procurement, financial management and implementation support. As described in the mid-term evaluation report, "the short-term objectives of MDST were largely achieved. However, the institutional impact of MDST's activities were limited." The high-level Joint Management Committee (JMC) was also a positive innovation in donor/recipient coordination. On the other hand, the report stated that "the MDST had in essence created parallel structures that circumvented the American and Malian bureaucracies---instead of diminishing the work load, the necessity of keeping two sets of books--even if one is computerized--adds to the staff time and energy expended. Similarly, the MDST Director of Administration set up and operated a parallel, almost private, procurement and contracting office, which is independent of the GRM and its established procurement procedures."

Major efforts to integrate improved management and administrative systems were deferred early in the Project in favor of implementation: construction, commodity procurement/management and training. Within two years of the start of the Project, most commodities and equipment had been purchased and put in place. Construction took place with little delay, except for that of the diagnostic lab. The administrative and financial support provided by the MDST was successful in lessening the normal burden of compliance with USAID regulations and reporting procedures for procurement and financial management.

The mid-term report recommendations for shortcomings to be addressed in the second half of the Project include:

- Transfer of management skills
- Design and implementation of a Management Information System (MIS)
- Reduction of management costs
- Specification of the MDST as an independent source of professional advice to the Project
- Improved communication between USAID/Mali and the MEE on policy issues through strengthening the role of the JMC
- Reduction of JMC micro-management

Progress in improving management and administration since the mid term evaluation has continued, but at a slower pace than previously. Emphasis in the period covered by the Project extension has been on integration of improved systems of financial management and

discussion of MIS. Institutionalization has proven to be more complicated and time-consuming than anticipated by planners. Some of the factors contributing to the slow rate of change were in the areas of technical assistance, training, MIS design and implementation, personnel management and communication and other miscellaneous factors.

### ***Technical Assistance***

Contractors experienced major problems in recruiting and retaining technicians for sustained in-country service. This was possibly due in part to unrealistically high standards and an extensive screening process. There were a number of changes in key Project personnel during the entire project implementation period. Funding cutbacks at Project midstream forced the cancellation of some technical positions and the change of others from long term to short term.

MDST was unable to fill staff positions with civil servants and hired staff on contract. Ideally, personnel from the various Project supported divisions would be assigned to the MDST for one or two years and return to their original positions. In this way staff from each division would be familiar with improved management and administrative systems and could assist in their introduction and use in their own situations as well as integration across the divisions and throughout the MEE. As reported by the departing Director of Operations, "This early change in implementation was to severely compromise the future ability of MDST to undertake effective institution building efforts." However, currently contract employees are for the most part in accounting, mechanic, and electrician positions.

### ***Training.***

Some of the training provided was described by participants to be somewhat "theoretical" and did not relate to the realities of GRM organization and management, i.e., a highly centralized system with little delegation of responsibility in which information flows only from the bottom to the top. Some returned graduates' skills were under-utilized or not used at all by their respective institutions. (See Participant Survey, Annex II.)

There was a marked lack of effective planning for collaboration and cooperation between the different divisions which serve the same client groups.

## ***MIS.***

A prototype model of a MIS was to be installed for the animal health division and a computerized documentation network installed throughout MEE. A continuing education program for all MEE personnel in manual and computerized methods of selection, collection, collation analysis and diffusion of data was to be undertaken. This was to be part of an Action Plan to be prepared by June 1988 by an MIS specialist. Present plans call for a six month PSC for a specialist to begin work by January, 1991.

## ***Personnel Management, Communication.***

Little or no attention was given to personnel management. Job descriptions and institutional goals need to be set out and systems including performance evaluations and incentives need to be put in place. Project progress and accomplishments should be communicated to those involved in Project efforts.

## ***Miscellaneous.***

The Project was without a Director of Operations for a year. There was limited follow-up on studies and reports. Annual work plans for each of the three Project supported activities and standardized reporting procedures have not been prepared or carried out, despite recommendations to that effect.

The new Director of Operations is convinced that the MIS and improved financial management can be institutionalized, at least in some of the institutions, by the end of the Project. The new Director has excellent West Africa work experience and is committed to the collaborative mode of management and delegation of responsibility. In his first month on the job he implemented a system of rotation of financial personnel into MDST for on-the-job training. He introduced the same practice with the MEE financial staff for intensive computer training in the MDST.

## ***Other Considerations.***

The MDST plays an important liaison role among the various organizations involved in the Project and serves as a conduit for the AID viewpoint. As discussed in the mid-term evaluation, the major emphasis of the MDST during the first half of the Project was on implementation. Due to this emphasis and to a shortage of personnel and resources, however, management development within the divisions was relatively neglected during the first few years of the Project. In addition, other than work plans, the management systems introduced were specific to American accounting and procurement controls and procedures. These differ from those in the GRM which are based on the French system.

The MDST was particularly successful in permitting a rapid implementation of the Project through its role in direct management of procurement (local), contracts, finance, and

vehicle maintenance. However, the cost of this unit (one-third to one-quarter of the Project budget), although comparable to similar administrative units in other USAID-funded projects, is very high for administering a single project.

A factor which contributed to the high operating cost of MDST is the use of contractual employees. As discussed in F. Doamekpor's report on financial management (Annex IV), the salaries and benefits of contract employees is considerably higher than those for civil servants. This may also result in some degree of resentment on the part of civil servants, both in MDST and in the divisions. Another concern is that implementation of structural adjustment measures which prescribe lower levels of public expenditures will mean that MDST personnel who have developed skills and knowledge through working with the Project will be the first dropped from smaller payrolls.

A recent problem for which the MDST may be partially responsible is the shortage of fuel and transportation in the field. The present allotment of fuel for an agent is only eight liters per month for a mopylette. This is not enough to allow agents to adequately service their territories. Fuel for the research vehicles has also been scarce. A part of this is due to the recent change in tax assessment which increases fuel costs and causes budget problems. MDST does not seem to have problems with fuel or availability of vehicles. A more rational allocation of fuel between field and Headquarters needs to be made by MDST along with the institution of economy measures and tighter control of vehicle use.

### ***Financial Management***

The Project has managed its financial activities well. Financial information generated by the MDST is accurate, useful, and has assisted in management decisions. (See report by F. Doamekpor, Annex IV.)

### ***Training***

A total of 21 long term participants were trained in a variety of disciplines with Project funds. (See Annex V.) A partial survey of these participants and other informed sources revealed that the training was generally relevant and adequate. However, there were some problems with participants being able to utilize their new knowledge upon their return. There were also complaints about not being rewarded with more responsible positions and higher pay. Finally, there have been several participants who left the Project for other positions in the GRM or outside the government. For example, none of the five long term Project participants now work with the Project.

## ***Studies and Reports***

MDST has effectively coordinated the conduct of studies and preparation of reports. There are several studies that have been carried out by the Project related to marketing (Duggan), institution building (Kraidy and Provonost) and MIS (Poulin and Desjardins). A full list of studies and reports is included as Annex VI.

Michael Kraidy of the Chemonics team prepared a report in 1986 entitled "Institutionalization of MDST Functions within the Ministry of Natural Resources and Livestock" in which he argued strongly for automated or computerized systems for information. He cited the centralization of authority as a major constraint in information flow problems. "All decision making, sometimes regardless of importance, is handled by the central authority figure. This causes the authority figure to be tied down with unnecessary demands on an already constrained time schedule. As a result many important decisions are delayed. Authority must be delegated and allowed to recommend as well as implement the controls that are deemed necessary. Many Division Chiefs, Regional Chiefs as well as Sector Chiefs simply do not have the authority to make crucial decisions that can affect the performance of those that they are supposedly directing. Apathetic and listless attitudes are prevalent across centralized authority systems".

Kraidy recommended an expanded training program to facilitate the institutionalization of MIS. This includes three highly qualified personnel, one of each from MDST, OMBEVI and inspection and/or the CAF, for a rigorous three to six month training program in micro-computer systems and application packages. These three would return to become computer training agents.

Recommendations from the above as well as other studies, for the most part, appear to have been set aside or ignored, based on a review of JMC, RC and quarterly reports.

An economic study by R.R. Nathan and Associates (Ariza-Nino) in 1988 evaluated Project benefits from the animal health and research components. Ariza-Nino developed a methodology for a differential valuation of female animals when estimating monetary losses from epizootic diseases. His adjusted basis was used in updating the economic analysis for the 1988 PP Amendment No. 8.

## ***Garage Operations***

MDST maintains a garage which oversees the operation and running of approximately 43 vehicles. As a central garage, it repairs and stocks all parts necessary for the smooth running of these vehicles. The garage has 12 staff members; one garage keeper assisted by a store keeper who maintains records of spare parts purchased and used, five mechanics, one electrician and four trainees. Therefore, in terms of manpower, the garage has considerably more than it currently needs.

The fleet of vehicles maintained by the garage is distributed among MDST and the divisions as follows:

**Distribution of Vehicles  
Mali Livestock Sector II Project**

As of 17 September 1990

CATEGORY	NO. OF VEHICLES	TYPE
CVL	6	2 Landcruisers
		2 Land Rovers
		2 Peugeot
DNE*	17	1 Peugeot
		1 Toyota
		15 Land Rover SW
MDST	12	2 Peugeot
		5 504 Break
		2 Land Rover
		1 Peugeot Bedine
		1 Mercedes Truck
		1 Toyota Cruiser
CRZ	7	1 504 Break
		5 Toyota Cruiser
		1 Land Rover

Source: MDST Records, Bamako

\* DNE had 19, two of these are disabled.

Also disabled: MDST, 3; CVL, 1.

The average age of these vehicles is six years. In Mali, the average useful life of a car is three to four years. It could therefore be said that the garage manages a relatively old fleet of vehicles. This is sometimes reflected in the costs of repairs and maintenance.

For the period for which data are available, repairs and maintenance costs have risen. These figures reached astronomical levels in 1989. For the period October 1, 1989 to April

30, 1990, repair and maintenance costs totaled 11,609,515 FCFA. The average cost per vehicle for the period was 208,018 FCFA. Repair and maintenance costs in 1984 were 67 percent costs incurred in 1985. 1986 repair and maintenance costs increased by 20 percent over those of 1985. In 1987, repairs and maintenance costs were 2.5 times more than in 1985. By 1989, these costs had multiplied 34 times over the 1985 level.

A review of fuel consumption records for all vehicles has also established that fuel costs have risen over the period.

The above comparison indicates the following:

- The current fleet of vehicles is old and costly to maintain.
- This could have serious budgetary implications, especially on operation costs.
- Something urgent must be done to avoid extreme costs for repairs and maintenance.

In addition to the problem posed by vehicle age, other difficulties inhibit the smooth functioning of the garage. Most important is a shortage of spare parts. Part of the source of this problem was with AID--procedures for procurement which are cumbersome and time consuming. Another problem is the unreasonably long time it takes the local supplier to order and deliver parts.

Other problems include contractual arrangements for mechanics and the change in government policy regarding the Project's tax exempt status. The latter has increased fuel costs and rendered cost containment difficult.

The garage is expected to repair personal cars of staff without payment. Although parts are supplied by the staff for such repair works, valuable employee time is lost to the Project. In addition, an agreement between PARC and the MDST requires the MDST garage to repair PARC cars at no charge. For the period for which data are available, 1989 only, 29 PARC cars/trucks were maintained by the garage.

A garage consolidation plan for MEE which would continue vehicle maintenance and repair training programs was suggested by the mid-term evaluation. This plan has been discussed as to whether it is really needed and whether expatriate assistance is called for. The new Director of Operations believes that no outside assistance is needed. USAID favors technical assistance to help develop a garage consolidation plan.

## **ANIMAL PRODUCTION/INRZFH**

### ***Research Studies, Forage Production, Animal Feeding Tests***

The Research Institute (INRZFH) performed well. It developed productive research which is being tried by selected farmers. Much technology brought to the field is proving useful and is improving the quality of life for many farm families.

#### ***Research in Progress.***

##### **Sub-Humid Zone**

INRZFH and ILCA are collaborating on research within the 100 kilometer belt around Bamako to determine the relative productivity of three dairy systems. Included is a study of the effects of pre-natal and post-partum feeding of brood cows on birth and weaning weights of calves. This involves routine weighing of calves and milk production. A mono-digestive feed ration has been developed for young calves to see if they can be raised economically and efficiently using it as a partial substitute for milk. In addition breeding records are being kept and cross breeds are being observed.

This research will determine which of these systems are profitable. Researchers are discovering that traditional habits of herdsmen are difficult to change as they attempt to introduce new concepts. This will have to be taken into consideration as technical packages are developed. Improved management and production techniques will evolve, enabling higher production at lower cost. The research will provide valuable information about the breeding efficiency of local herds within the 100 kilometer belt of Bamako.

Forage production trials at Sotuba compare the production of different legumes receiving a variety of inputs. Dolichos and cow peas have been introduced and are being extended. Dolichos has become popular in parts of the sub-humid zone because it remains green into November and even December after other crops have been harvested and can be harvested when there are few demands on the family labor pool. It is easier to cure than other crops because it is made into hay after the rains have ended.

In Kati, improved poultry housing has been constructed for demonstration and extension and other poultry husbandry is being extended. A village association is starting a poultry production project adopting new innovations. Dr. Abdallah Oulde Salick Kounta was assigned by DNE to work in the Cercle de Dioila, forming poultry associations and promoting the production of poultry products. With the support of the Chef de Cercle, he has been assigned two field agents whom he has trained in the basics of poultry production. Together they are working in Dioila and ten surrounding villages. Here people are being

organized into associations, taught basic poultry husbandry, given assistance in procurement of feed, vaccinations, improved cocks and other inputs, as well as taught how to construct inexpensive, sanitary poultry houses.

Under Dr. Cook's (the former Director of Operations) assistance, Dr. Kounta has been receiving financial assistance from the Project. It is an unbudgeted item, thus the future of this valuable activity is unsure. The first association was formed in Dioila with a membership primarily consisting of school teachers and other civil servants. They have participated in poultry improvement by creating a demonstration for farmers in the outlying villages to copy.

Chickens and guinea-fowl are mixed because the guinea-fowl are not good brooders. The hens collect the guinea-fowl eggs, adding them to their own clutch where they are eventually incubated and cared for after hatching. Guinea-fowl sell for 650-700 FCFA, local chickens for 450-500 FCFA and offspring from the first cross with improved cocks sell for at least 750 FCFA in Dioila markets. Cross-breeds are marketable much faster and many weigh more than local birds.

### **Semi-Arid Zone**

Research in Banamba is going forward on a three hectare plot with only a fence around it and no buildings. This demonstrates that research can be done with a minimum of expensive infrastructure. See Annex VII for a diagram of this research station which shows the research that is underway and the arrangement of the research plots.

Zangreni maize and Niebi 88-66 are short season varieties that proved productive and have been distributed to 420 women for field testing. Clitoria has demonstrated extraordinary drought resistance. Although all signs of vegetation may be consumed by sheep, goats and donkeys, when the rains come, it's viable roots regenerate. It also produces viable seeds for propagation. Forage trials started by ILCA at Sotuba are being continued and the results will be tested in the sub-humid zone.

### ***Dissemination of Research Results.***

The following seven technical packages developed from research completed by CRZ were taught to DNE & OHV field level agents and are being extended to farmers.

1. **Embouche Bovine:** Discusses criteria for selection of suitable feeder animals, three rations, health program and general procedures for feeding bovines for market.
2. **Treating Rough Forage with Urea:** Gives dimensions of a silo to be constructed of banco, discusses the reasons and benefits of the treatment and how to use it with draft and feeder cattle.

3. Improved Small Ruminant Production (Semi-Arid): Discusses merits of building shades, separating undesirable males at six months, selection of breeding males, supplemental feeding of breeding ewes, health programs and marketing.
4. Lablab purpureus (2 varieties of dolichos)
5. Clitoria ternatea
6. Stylosanthes (2 varieties)
7. Niebe TN 88-63

Packages 4 through 7 describe six legumes, individual characteristics, culture, harvest and uses.

Thirteen research papers published by INRZFH in collaboration with ILCA and six published by INRZFH alone are listed in Annex VI and ensure that research results are disseminated to a professional audience.

### ***Sustainability and Recurrent Costs***

It is not feasible to expect extension and research to be self sustaining activities. They do not normally have a product to sell for which there is a market. Their product is innovation to traditional practices which when properly tested and proven, needs sensitive introduction to farmers. Farmers are reluctant to change something they have been doing for years. A proven track record of successful practices will need to be established before farmers value extension services.

The new technical packages being introduced are, in general, sustainable. No hybrid varieties are being introduced. For the first few years farmers will be able to save their seed. When DNE and INRZFH supply seed of a new variety such as dolichos to farmers, they are required to return a larger amount of seed at the end of the growing season than they received at planting time. This is done with distribution of other inputs as well, including improved livestock. If farmers save seed year after year, there could be some degeneration of productivity. Extended dry periods could reduce or almost eliminate the seed supply. For these reasons a private sector seed farm is essential. When all components are in place for an integrated livestock/farming system this would be fully sustainable. However, this will not occur during the LOP.

## **Extension**

### ***Improved Management Practices.***

Some of the techniques that have been introduced and are being adopted by farmers in the Project area and which are leading to better management of dairy, feeder and draft cattle as well as small ruminants include:

- Keeping livestock in improved holding pens.
- Constructing hangars in pens to provide shade and storage for improved forage.
- Feeding crop residues which have increased nutrition from urea additions and improved palatability from molasses addition plus storage in banco silos.
- Feeding improved supplementary rations.

See Annex VII, for an example of an integrated livestock/farming system.

These interventions also have brought the fattening program from its crude start in 1975 to the point where it is beginning to be a well managed and growing industry. It provides profitable dry season employment for family labor and converts crop residues to cash. In addition, it has been estimated that manure accumulated while penning livestock in Regions I and II alone has the cash and fertility equivalent of 503 fifty kilogram sacks of urea and 435 fifty kilogram sacks of super phosphate. This equates into reduced production costs for farmers as well as reduced importation of chemical fertilizers thereby conserving foreign exchange.

### ***The Cattle Fattening Program.***

The success derived from experience gained during the 15 years since the start of the cattle fattening (*embouche paysanne*) component is evidenced by the enthusiasm of people who have learned the business. For instance, M'Paba Sylla has a 200 head cow herd. This year he fed thirty bulls and steers. Nine were fed collectively with his village association, the rest he fed at home. He likes to market finished cattle in the Banamba market where the home field advantage helps him negotiate a better price. Another example is Mamadou Diancoumba who is president of the 70 member Sirakorola Cattle Feeders Association. After hearing about availability of residual ECIBEV funds through BNDA, he attempted to borrow over 22,000,000 CFA on behalf of his association. If granted, each member would have fed four head. He only obtained enough financing for forty head. The loan has been paid back and he hopes next year's loan will suffice to purchase and feed 280 head. Credit must be available to support continued growth of intensive cattle feeding which requires a substantial initial financial investment to buy the stock.

More money is paid for bigger bulls or steers but a premium price is not paid for quality beef. This is not true for small ruminants, particularly sheep immediately before the

celebration of the Moslem holiday known as Tabaski. Farmers are beginning to recognize the profitability of carefully timing their small ruminant feeding programs to bring them onto the market in time for this holiday when many urban dwellers will pay as much for a good fat sheep as they would normally have to pay for a bull.

### *Poultry.*

Little if any poultry research has been done by the Project. The extension service and NGOs have been teaching poultry husbandry as well as supplying improved breeding cocks to village associations. A half-breed bird is marketable months before it's unimproved cousin and fetches 750 to 1,000 CFA rather than 500 to 600 CFA for the unimproved bird. Vaccination for Newcastle disease and better management reduce mortality and increase productivity. The Sunday market at Dioila is alive with dealers buying poultry and the street is jammed with small trucks and vans waiting to transport them to Bamako for re-sale. The Chef de Cercle said market supply never satisfies demand.

### *Social and Economic Benefits.*

Village associations with which Project activities work bring people together in a united effort to raise their income level. These associations provide a vehicle through which extension agents can reach a greater number of people, which multiplies their effectiveness. They also are a legal entity to which banks are authorized to grant credit.

### *New Linkages.*

In the past fifteen years, the veterinary service has made admirable progress in broadening its attitude toward cattle raising. Formerly veterinarians thought that animal health and disease prevention would solve all the problems in the livestock sector. Now they recognize that management, breeding, nutrition and many other factors are of equal importance. It was interesting to hear veterinarians discuss their need for expertise in extension, management and animal production. This new attitude as a driving force in the recently privatized veterinary profession and pharmaceutical industry will accelerate the forward thrust of Mali's livestock sector development. As more veterinarians leave government service to enter the world of private practice or take up executive positions in private sector enterprises, they will forge linkages with former colleagues remaining in the government.

### *New Activities.*

#### **Organic Fertilizer**

As a result of being taught the benefits of feeding their oxen for improved performance, farmers have learned the economics of storing hay on hangers within small corrals. This serves as a storage place for hay as well as providing shade for the cattle

which concentrates accumulation of manure under the shade. The next step in this learning process was the incorporation of compost pits. The Project is researching the use of manure and compost in various amounts, rotations and time frames to determine the most efficient formula for use. It has been observed in some places that the application of chemical fertilizers is being reduced as a result of increased manure production and use on the fields. The evaluation team acknowledges that use of manure and composting pits is not new to Mali; however, putting all the elements of this system together and promoting their use, may be attributable to USAID interventions. This includes the following:

- Collecting and storing crop residues and bush hay for feeding during the dry season and to reduce the incidence of bush/grass fires.
- Improving the palatability and nutritive value of low quality roughage with urea and molasses and storing it for short periods in banco brick silos.
- Supplemental feeding of oxen.
- Cultivating legumes and other forage for soil improvement and supplemental livestock feeding.
- Using compost and manure to replace fertilizer and improve soil condition.

#### ***Collaboration.***

It is difficult to quantify and separate the impact of USAID's different interventions through Mali Livestock Sector II, Farming Systems and Extension, OHV or that of CMDT and other parastatals. Because of close collaboration in the field and overlap and support for each other's activities and the active exchange of ideas, these interventions have become tightly knit into local farming systems.

In addition, Project activities contribute the following towards improving the environment:

- Teaching farmers to improve bush hay with urea and molasses and storing it in banco silos has resulted in farmers cutting more grass during the dry season. Realizing this benefit, the Forestry Division began working with DNE in the vicinity of Dioila, to encourage farmers to cut grass even more in an effort to reduce the incidence of grass and brush fires.
- Planting legumes to build soil fertility and prevent erosion.
- Planting legume trees as wind breaks to prevent wind and water erosion of soil and to conserve soil moisture.

## ***Reorganization***

Re-organization of research institutions into a stronger, more diversified IER is expected to strengthen old and forge new linkages, particularly between research and extension activities.

The livestock sector must establish a good lobby with strong representation within the research governing organization to assure that adequate, meaningful livestock research is conducted.

## ***Summary***

It becomes apparent that there is a need for a comprehensive livestock breed improvement program. Three different types of cattle must be developed to produce milk, meat and power. Dual purpose sheep and goats should be developed with emphasis on milk production. A local breed of chickens must be developed for egg production and another for meat.

Outputs from research satisfied Project objectives, met log frame requirements and gave full value for money spent. Major economic benefits from extension of research interventions will be delayed until more field testing is completed and the extension service has been upgraded with additional training.

## **ANIMAL HEALTH/CVL and DNE**

### ***Accomplishments***

The 1982 Project Paper listed several goals for CVL. In disease diagnosis, four constraints were identified. The first was the lack of diagnostic facilities; the second, lack of adequate transportation; the third, lack of adequate facilities at CVL and the regional level; and the fourth, lack of trained staff.

All of these constraints have been overcome with the exception of the second. The diagnostic lab is equipped and staffed with trained diagnosticians. In applied research, activities in all of the relevant areas have been continued. In protozoology and entomology results have been good. In acarology things have fallen off since 1988 as money and vehicles for field trips have been lacking. Research in microbiology got off to a slow start, but with a personnel change and provision of a dependable water supply, research there has also picked up.

To improve vaccine quality, a laboratory animal center was needed. The serum production facility was to be totally revamped to serve as a lab animal facility. That has been partially done, but the buildings themselves need to be refurbished and ventilated.

The new diagnostic and research building at CVL has been completed, four years behind schedule. A reference library was begun, but lacks the journals necessary to keep the researchers current in their fields. Computers have been installed for the researchers to store and analyze data and produce manuscripts and graphs. They are in constant use.

In 1985 a vaccine quality control section was added to the laboratory. Three long term technical assistance positions had been filled and their two year terms completed. The positions were in microbiology/vaccine control, helminthology and virology. At that time the diagnostic facilities and personnel were underutilized. Except for virology, where essentially nothing had been accomplished, the other sections each had a number of ongoing and completed research projects. Continuing education programs and manuals for the field staff of DNE were being prepared and several sessions for agents from the Mopti region and Regions I and II had been conducted.

The cold chain was put in place and worked well. Vaccines were supplied to the field in increasing amounts. Percentage of the herd vaccinated increased markedly over two years. Increased mobility was at least partly responsible for the improvement.

Projections for future accomplishments included construction, training, research projects, a system for efficient diagnosis, closer collaboration between CVL and DNE and demonstration of the quality of the vaccines produced to encourage an export market.

It was recommended that CVL be supported for as long as necessary ("for 10 or even 20 years"). It was noted that "we can conceive of no way that the laboratory and its various operations could become financially self-reliant." To help defray expenditures, it was suggested that the types of vaccine offered be expanded to include avian and small ruminant vaccines.

Other recommendations for CVL were continuation of training, especially in vaccine production and accounting and diagnostic capabilities. For DNE a method of fee collection was suggested to recoup some of the vaccine production costs. Continued applied research on animal diseases was also recommended, especially in the area of small ruminants and poultry. An assured water supply for the lab was the only new major construction suggested. It was strongly recommended that much of the major equipment in the vaccine production unit be replaced.

According to the same report, most of the problems at DNE required administrative assistance and training. Those problems were linked to:

- The quality of commodities and supplies delivered to it.
- Commodity needs being met only in the District of Bamako.
- Delays in the payment for vaccines sold to DNE.
- The lack of veterinary pharmaceutical products in the field.
- The small number of samples sent to CVL from the field.

Some of these problems still exist and training and support in administrative techniques is required to remove them. Such assistance would also help DNE to address some of its less tangible, yet difficult problems relating to the coordination of its activities and cooperation with CVL. Assistance to DNE is also necessary for its administration to contribute to efforts towards the privatization of veterinary services and to address its prospective financial self-sufficiency.

The recommendations of the mid-term evaluation aimed at:

- Achieving DNE's financial self-sufficiency.
- Improving coordination between DNE and research structures on one hand, and between DNE and its field agents on the other.
- Extending the activities of field staff to programs other than vaccination.
- Involving short cycle animals in Project activities.
- Organizing continuing education for field agents.

### *The Diagnostic Network.*

Progress toward establishing a diagnostic network has been good. Since 1988 instead of the field agents submitting their samples to the DNE as was done before, they now send them directly to the lab which is organized to rapidly process the samples. The pathology section receives them and assumes the main responsibility for diagnosis. If warranted, samples are sent to other sections (helminthology, bacteriology, etc.) for further processing. The results are sent out by radio to the veterinary post concerned followed by a written report to the DNE (Table 1).

**Table 1.**

<b>DIAGNOSTIC WORK</b>			
<b>Number of diagnostic cases done by each section at CVL</b>			
<u>Section</u>	<u>1988</u>	<u>1989</u>	<u>1990 (Jan-June)</u>
Pathology (autopsies)	39	57	149
Protozoology	308	206	52
Helminthology	310	118	82
Food Microbiology	327	674	612
Microbiology (virology & bact)	160	202	88
Rabies	39	23	10

The veterinary diagnostic service became fully operational in 1988-89. Up until that time almost all of the diagnoses reported were on samples collected by lab personnel in the course of their research. In 1988 the pathology section was begun and communications with DNE were improved. In 1989 a radio set was installed at CVL and equipment for doing histopathology arrived.

Training of the Post and Sector heads has been carried out in the areas of autopsies, blood samples and disease diagnosis. These sessions have taken place at CVL using demonstrations and videos as well as in the field. Writeups, some very extensive, have been prepared and distributed. For some of the field trips, agents from DNE went along to participate in the training (Table 2).

Table 2.

TRAINING GIVEN BY PROJECT PERSONNEL

<u>Year</u>	<u>Time</u>	<u>Recipients</u>
1986	5 mos	ODEM (2)
	theses	IPR (3)
	1 wk 4 days	ODEM EIV
1987	1 wk	ISA (epid., immunology, path., sampling)
	1 wk	DNE (refrigerator maintenance)
	theses	IPR (9), INSUP (2)
1988	1 wk	DNE (Chefs des Sectors)
		DNE (Chefs des Posts - in field)
1989		DNE (Chefs des Posts - in field)

Another part of the diagnostic service is the Food Microbiology section. Its mandate is to examine foods of animal origin submitted by the veterinary service (District of Bamako) to determine their fitness for human consumption. In fact, because no other similar facility is available, they also analyze other samples such as well water animal feed, and dried fruit (Table 3).

Table 3.

FOOD MICROBIOLOGY

Annual number of samples processed by the Food Microbiology section at CVL

	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990 (Jan-Aug)</u>
No. Samples	243	136	351	240	343	674	679

Increasing collaboration with the local veterinary post has led to a continual increase in the number of samples submitted, but certain problems, discussed below, hinder their ability to expand or even maintain the same level.

### ***Animal Health Campaign.***

The initiation of an effective animal health campaign is a combination of improved diagnostics, improved communications and transportation and improved delivery of a better product. The first subject, diagnostics, has been discussed. Improved communications and transportation have occurred. The installation of a radio in every sector in Mali with regularly scheduled hours to talk with the CVL and DNE has enabled CVL to investigate outbreaks of disease in time to prevent major problems (Table 4). Improved communications between the DNE and CVL are also occurring. Although still not good, considering past performance, the lines of communication are open and they seem to be improving.

Improvement in transportation has occurred due to the mobyette buying program begun in the first part of the Project (1984). The program has been having problems recovering loans when DNE field agents terminate or move to a different region, but the program has been successful in the other divisions. The program was set up so that after borrowing from the fund, money was withheld from the borrower's paycheck. When a borrower transferred to a different region, the paymaster in that region did not always withhold from the new person's paycheck. If anyone from a service was delinquent, no more loans were made to that service even if there were funds from the people who had paid. For that reason no more loans are being made to DNE and the original mobyettes are wearing out. It would be better if DNE would make more of an effort to collect from its people and MDST would liberalize its rules to allow loans to be made from money that has been repaid. The mobyettes are well suited to the roads and weather conditions of the field, but they wear out after three or four years.

Improvement in product has two aspects. One is the availability of veterinary pharmaceutical of good quality and the other is the availability of effective vaccines. The former is occurring with the privatization of the Malian Veterinary Pharmacy. We found privately owned and operated veterinary pharmacies in areas of high livestock production. In areas where livestock were less important, the sector maintained a stock of drugs. The increased availability has definitely filled a need because there appears to be a brisk trade in antiparasitics such as Berenil and Trypimidium (antitrypanosomes) and Panacur and Exhelm II (anthelmintic).

For the second aspect, efficacious vaccines, there are two major components. The first is quality production which will be addressed in the next paragraph, and the second is the maintenance of the cold chain. The Project initiated a cold chain early on that has operated efficiently and is still maintained. There have been seminars given on maintenance of the freezers (Table 2). Research and development presently going on in Nigeria may result in production and distribution of a rinderpest vaccine (the vaccine presently most responsible for the necessity of a good cold chain) that is much more tolerant of above freezing temperatures and may help avoid the present weak links in the chain, i.e. the problem of maintaining cold between the office and the end of a day of vaccinating.

Table 4.

**DISEASE OUTBREAKS**  
**Number of outbreaks of disease recorded from Mali**

<u>Year</u>	<u>Disease</u>	<u>REGION</u>							<u>Bamako</u>
		<u>I</u>	<u>II</u>	<u>III</u>	<u>IV</u>	<u>V</u>	<u>VI</u>	<u>VII</u>	
1986	Ovine Past.	1	4	1	4	1	0	1	0
1987		1	9	1	1	1	0	1	0
1988		2	3	8	4	5	1	0	0
1989		0	0						0
1986	CBPP	0	5	0	3	0	0	0	0
1987		0	2	0	1	0	0	0	0
1988		1	1	0	1	7	0	0	0
1989		1	0						0
1986	Rinderpest	0	1	0	2	0	0	0	0
1987		0	0	0	0	0	0	0	0
1988		0	0	0	0	0	0	0	0
1989		0	0						0
1986	Anthrax	0	0	1	0	0	0	0	
1987		1	2	0	0	4	0	0	
1988		0	3	2	0	3	2	0	
1986	Blackleg	0	10	10	3	0	0	0	
1987		1	9	13	10	17	0	0	
1988		0	11	12	9	14	1	0	
1986	Bovine Past	1	4	3	2	1	0	0	
1987		1	4	2	5	3	0	0	
1988		1	6	2	4	1	0	0	

### *Vaccine Quality Control.*

The first part of vaccine quality is in the manufacture. The vaccine must have a high enough antigenic mass (titer) to adequately stimulate the immune system. Secondly, live contaminating organisms must not be present (purity). Lastly, the vaccine must not contain anything that would cause a major reaction (inocuity). Previously the production unit had done its own quality control. To avoid problems of bias, it was thought that control should be moved to another unit.

Testing for the three characteristics mentioned above is the responsibility of the vaccine quality control section. Beginning in 1985, it has tested every lot of vaccine produced. In general it has been shown that the vaccine produced is of good quality (Table 5). The rinderpest and CBPP vaccines are sent to a laboratory in Dakar where results are in agreement with those of CVL. Recently there have been some problems with the lyophilized, live vaccines. These will be addressed in a discussion of equipment.

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Table 5.

**VACCINE CONTROL**  
Results of quality testing of vaccine lots produced at CVL

	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990 (Jan-June)</u>
Total No.	15	51	31	27	37	35
No. Acceptable	7	45	23	21	29	29
% Acceptable	47	88	74	78	78	83

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To verify the efficacy of a vaccine, ideally one should vaccinate half a group of susceptible animals and then challenge all of them to see whether the vaccinated animals are protected. An isolation ward was planned and built in the new diagnostic and research building with that purpose in mind. While no one on the evaluation team is an expert on the subject of quarantine maintenance, flaws in the design and construction were obvious. Correcting them would be an expensive, time consuming operation. Because of the real potential of something going very wrong when used, this should be given a very low priority. A second, less certain, method of determining efficacy is to measure an antibody change after vaccination. This technique can be verified, however, if a relation between protection and the particular immunological reaction can be shown. For this reason and for epidemiological reasons a serosurveillance program was undertaken.

A system of randomly selecting herds and members of those herds within four age groups (0-1, 1-2, 2-3, 3+ yrs) to be bled was instituted in 1988. In 1989 some of the flaws in the randomization design were corrected so that a more representative sample could be taken. CVL workers did the sampling in 1988, 1989, and 1990. In the future, DNE agents will undertake the task. The serum was tested for antibodies to rinderpest and then banked for future use when other tests become available (Table 6).

The results of this survey (1988) demonstrated that the per cent positive (i.e. protected) varied with region and age. Figures for 1989 show a sharp rise in protection. The reason for this is that after the first round, the results were poor. The sector chiefs were called together for a meeting to explain the findings and to encourage them to do better in the future. Now that they know that there is a way to check the quality of their work, the quality seems to have improved. When determining the rate of protection, one should keep in mind that a large majority of the herd is in the 3+ year age group.

Table 6.

## SERO-SURVEILLANCE FOR RINDERPEST

	<u>No. Samples</u>	<u>1989 % Positive</u>				
		<u>0-1 yr</u>	<u>1-2 yr</u>	<u>2-3 yr</u>	<u>3+ yr</u>	
<u>Total</u>						
Reg I	1117	35	55	47	52	45
Reg II	2878	54	64	61	64	58
Reg III	1043	51	67	67	49	58
Reg IV	1143	43	58	57	43	41
Reg V	1295	39	58	63	62	54
Reg VI	459	36	33	48	62	48
Reg VII	620	39	46	48	58	49
Total	8202	45	59	55	54	52

Except for the < 1 yr of age, these numbers are not significantly different.

	<u>No. Samples</u>	<u>1990 % Positive</u>				
		<u>0-1 yr</u>	<u>1-2 yr</u>	<u>2-3 yr</u>	<u>3+ yr</u>	
<u>Total</u>						
Reg I	1240	64	65	78	73	71
Reg II	1182	42	60	70	77	67
Reg III	2455	57	77	92	92	87
Reg IV	1197	67	83	94	94	89
Reg V	2510	55	69	81	82	73
Reg VI	1040	53	76	87	89	81
Reg VII	533	28	48	72	76	55

*Applied Animal Health Research.*

Applied agricultural research is the backbone of agricultural production and absolutely necessary to improve food production. This should be done on-site as the interaction of variables such as climate, soils, disease, sociological variables, etc. differ from country to country. Seemingly insignificant differences between sites may be important.

The Project as a whole has an excellent record in the area of animal disease and production research. Almost all of the sections of CVL have been involved in work that can be and in some cases has been applied to protect the health of livestock.

**Pathology Section:** An extensive trial was done to determine the cause of a paralysis of cattle that occurs at the end of the dry season in areas of reduced rainfall. This condition had been recorded in an earlier CVL project (1981) and similar conditions have been described in many other parts of the world characterized by phosphate poor soils and hot, dry climates. It was found that some of the animals responded to vitamin E/selenium and others responded to improved nutrition. Since many affected animals, but not all, were periparturient, aged cows, it was conjectured that the syndrome had a variety of causes including malnutrition, botulism and selenium deficiency.

**Protozoology Section:** The geographical distribution of the various species of trypanosomes was collated from the information gathered during numerous field trips made starting in 1979. A summary is available. In addition to the cattle herds, a camel survey was done in the Tombuctu area. It was found that in some areas up to 20 percent of the animals were affected and a herd was either heavily infected or not infected at all. Strategic treatments for bovine trypanosomiasis were developed for two areas that differed in tsetse challenge. In a relatively light, riverine challenge, it was found that the most efficient way to protect the animals was to treat with Berenil those few animals that got sick during the wet season. At the end of the wet season, all animals should be treated with Trypimidium, a long lasting three month trypanocide. In an adjacent area that had once been a site of savanna tsetse fly (Glossina morsitans) infestation, settlement and possibly drought had changed the ecology to the point that no trypanosome challenge existed.

In a heavily infested area outside the Project zone, it was found that 65 percent of the animals were infected. This is an area to which many trypanosensitive Zebu cattle had moved as a result of the drought and of farmers' desire for bigger, stronger work oxen. In this area the CVL team initiated a treatment/control program based on Berenil and Trypimidium that caught on quickly among the farmers and herdsmen.

Work with an experimental N'Dama herd outside the Project zone showed that a good selective measure for trypanotolerance was the number of times in a year an animal had to be treated after the monthly blood sample. Use of this criterion as a selection index produced a susceptible and a resistant herd which was available for further study. A treatment schedule was developed for the calves that had not yet developed their resistance and mortality was cut by 40 percent.

Laboratory serological tests (ELISA, IFA) are being developed and used to determine the distribution of trypanosome species.

Other hemoparasites were also studied. A kit for the identification of Babesia bovis has recently been received from the International Atomic Energy Agency and is presently being used on the serum bank from the serosurveillance. Field trips through Regions I and II (1988) identified to some extent the presence of several tick-borne hemoparasites (Babesia, Theileria, and Anaplasma), but since the technique being used (the only one

available at the time), blood smear examination, is not sensitive enough to pick up many carrier hosts, the data probably greatly underestimates the true extent of their distribution.

**Helminthology:** Like protozoology, much of the work of the helminthology section was done outside the Project zone. Even though some of it applied to Project area cattle (fascioliasis of transhumant cattle from the Delta), the Project initially was unwilling to help fund this research.

Work funded by the Project is the study of distribution of helminths (flukes and nematodes) of ruminants in Mali and an epidemiological study of a particularly virulent hookworm of sheep and goats (as few as 24 can kill a lamb) called Gaigeria pachyscelis.

Other Project funded work was a survey of poultry intestinal parasites, a preliminary study of camel helminths and a study on the identity of schistosomes found in cattle. Collaborative research partially funded by the Project includes the epidemiology of Fasciola gigantica, the giant liver fluke of ruminants, in the Delta along with ODEM and comparison of locally available anthelmintic in sheep along with INRZFH.

Nonproject funded work since 1986 includes the efficacy of a levamisole based anthelmintic funded by a French pharmaceutical house and trials of various anthelmintic in ruminants in the humid region of Mali.

The importance of all this work is that the lethal effects of nematodes are much less important than the reduction in productivity be it meat, milk or number of offspring produced in a lifetime. The research now is at the point where treatment regimens can be tested. Typically what has happened in many parts of the world, particularly the U.S., is that livestock owners have been more or less randomly deworming their animals resulting in resistant worms and unproductive, infected livestock. Conversations with owners of veterinary pharmacies indicate that livestock owners here also treat in a hit or miss pattern. Strategic deworming programs must be developed and extended as quickly as possible to prevent that mindset from becoming entrenched. This is particularly important because grazing and therefore infection is done on common land.

**Microbiology:** This is a section begun in 1989 by merging the bacteriology with the virology section. Up until that time the virology section had not done much, but the present head is a well trained, dynamic virologist who has begun a number of projects.

Brucellosis is an important zoonosis in many parts of the world causing abortions in cattle and arthritis, fever, myocarditis, and death in humans. Along with TB it was the reason for required pasteurization of milk in the U.S.. If increased milk production in Mali is a goal, then brucellosis must be addressed.

**Table 7.**  
**BRUCELLOSIS**  
Serological reactors to Brucella abortus from different areas of Mali

<u>Species</u>	<u>Year</u>	<u>Place</u>	<u>No. Serum</u>	<u>No. Pos</u>	<u>% Pos</u>	
Bovine	1986	Bamako	1244	228	18	
		Koulikoro		413	63	15
		Segou		137	28	19
		Gao		425	1	0.2
	1987	Kayes		1		4
		Koulikoro		1		13
		Bamako		1		15
		Sikasso	1-> 8276			9
		Segou		1		16
		Mopti		1		12
		Tombuctu		1		5
		Gao		1		0.2
	1988	Kati		37	13	35
		Koulikoro		86	21	24
		Saprosa		169	66	39
		CRZ		161	53	33
		Kita		197	12	6
		Bamako		456	100	23
		1989	Bamako		1071	209
	Tienfala			304	64	21
Sanankorba			224	1	0	
Niono			109	35	32	
ILCA			472	106	22	
1990	Bamako		219	34	16	
	Kalabankoro		84	3	4	
	Tienfala		177			
51	29	Titibougou	53	0	0	
Small Rum	1986	Segou	377	5	1.3	
		Mopti	713	6	0.8	
		Gao	375	0	0.0	
	1988	Kita	169	0	0.0	
		Bamako	65	3	5	
		Banamba	47	2	4	
		Niono	31	0	0.0	

One of the major research projects of the microbiology section is to do a serosurveillance for brucellosis on samples from different parts of the country. Results so far show a very high prevalence of reactors around major population centers including Bamako (Table 7). They have been working with an ILCA/INRZFH project around Bamako aiming at stimulating milk production for the Bamako market.

Another zoonosis that recently appeared in Mali is Rift Valley Fever. Until relatively recently it was confined to East Africa. Using a kit provided by the IAEA, the microbiology section tested human sera from Niono, an area heavily infested with mosquitoes, one of the major vectors, and found that 17 percent were positive.

One of the factors preventing rapid development of poultry production is the high mortality among the local breeds and even higher mortality among exotic poultry breeds. A serological survey done in the major poultry supply area for Bamako showed that 49 percent carried antibodies against New Castle disease virus (Table 8). This confirmed the diagnostic lab findings that New Castle is an important disease locally. A rapid decline in mortality when flocks were vaccinated against New Castle disease occurred in the Dioila area and the members of the local poultry association have a monthly vaccination program for every chick hatched the previous month, when they can obtain vaccine.

Table 8.

POULTRY SEROSURVEILLANCE

Results of serology done on adult chickens from major poultry area of Mali

	New Castle Disease			Fowl Pox		
	<u>Total No</u>	<u>Pos</u>	<u>% Pos</u>	<u>Total No</u>	<u>Pos</u>	<u>% Pos</u>
Dioila	22	13	59	23	16	70
Kolokani	7	1	14			
Total	29	14	49	23	16	70

Another project in the microbiology section is the etiology of respiratory diseases of small ruminants. According to an ILCA study done in 1983, respiratory diseases are responsible for most deaths of sheep and goats before the age of five months. So far, because virus isolation equipment is not available, only the bacteriology work has

been done at the lab with ILCA doing the virus isolation in Dakar. Various organisms have been isolated (Table 9). This project does not seem to have been given the attention it warrants, especially since small ruminant production in sedentary farm households to a great extent benefits women.

Table 9.

**SMALL RUMINANT RESPIRATORY DISEASES**  
**Bacteria isolated from the lungs of sheep and goats with pneumonia**

Year	Place	Total No.	Bacteria Isolated	No Pts
1986	Tenenkou	16	<u>Past. multocida</u>	2
			<u>Klebsiella pneumonia</u>	8
			<u>E. coli/Staphylococcus</u>	9
	Djenne	3	<u>Past. multocida</u> <u>E. coli</u>	2 2
1986	Sevare	4	<u>K. pneumonia</u>	1
			<u>Staphylococcus</u>	2
			<u>Bacillus</u>	2
1986	Niono		<u>Mycoplasma mycoides</u>	
1988	Niono	5	<u>Mycoplasma mycoides</u>	3
1989	Bamako	1	<u>Mycoplasma mycoides</u>	1
	Tombuctu	1	<u>Mycoplasma mycoides</u>	1

**Entomology:** This section is composed of two parts, biting flies and ticks. Because of their importance as vectors of hemoparasites, entomology works closely with protozoology.

The tsetse group works primarily on control and distribution. The control program began in 1987 and was carried out in two phases. First, a pretreatment survey was done of the test area to determine the species and seasonal population parameters of tsetse flies present. Traps spaced at regular intervals were used to collect flies for

counting. Before placing the traps, a small study was done comparing the efficacy of four different types of trap. Then deltamethrin impregnated traps were placed at regular intervals and left for three months (the maximum duration of the insecticide). Deltamethrin is a synthetic pyrethroid which shows almost no toxicity for warmblooded animals and is commonly sold in the U.S. in over the counter flea sprays. After the traps were removed, four monthly counts were done and the results were compared both with previous data from the same area and with contemporary population figures from an untreated area (Table 10). The technique caused a greater than 95 percent reduction in fly population.

Table 10.

TSETSE FLY CONTROL - TIENFALA

Number Flies Captured/Cage/Day

	Day 0	Day 7	Day 30	Day 60	Day 90	Day 120
Control						
No.	216	184	140	124	156	188
% Red	-	15	35	43	28	13
Treated						
No.	155	17	19	4	2	9
% Red	-	87	81	95	98	93

Part of the study was to explain to the people in the local villages what the traps were for, both so they would not steal them and so that if they found any that were blown down, they would replace them. During the post treatment fly census phase, the cattle herders commented on how many fewer flies were bothering their cattle. The next phase of the study would be to do cattle blood testing within the treated and control areas to measure the difference in trypanosome transmission.

The distribution work was finished in 1988 and maps were prepared for the distribution of tsetse flies in Mali. This work should be continued at a low level in conjunction with other field surveys (tick distribution) in order to keep the maps up to date. Work mentioned under protozoology has shown that ecological changes caused by converting savanna grazing land to crop production has eliminated Glossina morsitans from certain areas.

The acarology group's main objective has been to prepare maps of seasonal distribution of livestock ticks. They have been working with the tick-borne disease group in protozoology. Because of problems with lack of fuel and aged vehicles, there have been no field trips since 1988. In the meantime the group has been studying the efficacy of pyrethroids against different species of ticks, the effects of ticks on the weight gain of calves and the effect of different acaricides against Amblyomma spp.

**Vaccine Development:** This is an endeavor only indirectly financed by the Project, but in which the lab is involved and which has direct effects on some of the Project objectives. Currently the major thrust is the development of avian vaccines, specifically for New Castle disease, fowl pox and salmonellosis. Beyond the desire to be self sufficient in vaccine, there are very real reasons for local production. One is that with imported vaccines, the cold chain can be suspect between the port of embarkation and arrival in Mali. Another is that for many organisms including New Castle virus, the different strains do not always cross protect, so unless local strains of New Castle virus are used, protection may not occur. Also, it allows the production unit to make use of its excess capacity. Most importantly it would ensure constant vaccine supply since foreign suppliers are sometimes unwilling to extend credit and sometimes will wait until there are enough orders to justify setting up production lines.

Research and development are going very slowly. To do a good job, pathogen free embryonated eggs are necessary to grow the virus. The flock on the research farm which supplies the eggs is not big enough to produce adequate numbers of eggs in a short period of time and they are certainly not pathogen free. There is no attempt at isolation. Much of the equipment does not function either from age or damage in transit. Incubators understandably cannot maintain temperature when the ambient temperature in the room exceeds the optimum for incubation.

There is certainly the expertise in the team to do the work, but one senses a feeling of frustration and discouragement.

#### ***Animal Health Extension.***

Strengthening the animal health extension service is a key objective in linking research and technical assistance with increases in production. Traditionally the only activity that the field agents were involved in was vaccination campaigns with a secondary interest in animal treatment. Now the concept of increased production due to factors other than the control of infectious disease is catching on. Talking with field personnel reveals an unexpected enthusiasm for the idea and attempts to actually engage in extension work. Sector and Post heads have attended seminars at CVL or in the field and have received technical bulletins concerned with animal health.

Animal health extension agents lack the training to communicate with people who will be applying the techniques. The agents need more in-depth training in extension methodology, including actual field work under the guidance of a good extension agent. The *Ecole des Infermiers Veterinaire* (EIV) is the alma mater of most of the field agents. In 1983 it began a curriculum that included courses in production and extension. Another new curriculum, not yet approved, increases that orientation but adds an insufficient amount of actual extension training.

In addition to training students in these fields, the EIV also offers alumni approximately six month-long seminars a year, when funds permit. So far they have been unsuccessful in securing Project funds. These seminars would be ideal for bringing extension methodology to field agents and the school itself would be an excellent instrument for bringing change.

In those areas where other projects with good extension programs such as CMDT overlap, field agents get some formal training by attending seminars and some informal training by interacting with agents of the other service. They have learned to take advantage of the opportunities presented by vaccination campaigns to make contacts with the producers and present new concepts in animal management. Some things almost sell themselves, like raising dolichos for forage or using genetically superior roosters for increased poultry production. Other practices such as ensiling hay mixed with urea or building improved poultry houses need more persuasion. Although improvement in this area is difficult to quantify, it is increasingly obvious in the field.

## ***Constraints to Accomplishment of Objectives***

### ***Establishment of a Diagnostic Network.***

While work on the diagnostic network has been underway for about two years, it still faces problems. The biggest hindrance to its function is getting samples from the field to the lab. Transportation has been blamed, but there is also the feeling that the agents could save formalized tissues to be brought in when convenient. At the moment all but a small number of samples come from the environs of Bamako. Until diagnostic capabilities are more widely available, it will not be of use to the country as a whole although it is certainly part of the reason that more intensive livestock raising is possible in the area around Bamako.

One way to make diagnostic capabilities more widely available would be to establish regional diagnostic labs in areas more accessible to livestock raisers. A small beginning is being made in that direction by supplying Veterinary Posts with the means to do some diagnostic work. Enhancement of that effort with the CVL acting as a backstop may be the next step.

It may be possible for the village associations to sponsor the training of one of their numbers at CVL. The association representative would be given the opportunity to learn proper nutrition and management, recognition of disease signs, collection of samples and would work as an ad hoc member of the diagnostic network. Among responsibilities of these representatives would be to alert the DNE field staff to problems in the area and to help with extension work.

Alternatively the diagnostic lab could include disease monitoring as a goal in addition to that of rapid identification of a disease. Samples collected from autopsies could be stored in formalin at the veterinary post until a traveler went to Bamako. Although the dead animal's owner would not be helped, in noncritical cases this would not matter. The lab would be able to monitor the situation and recognize important diseases, as was done in the case of New Castle disease in poultry.

### ***Establishment of an Effective Animal Health Campaign.***

Vaccination campaigns have made large strides with the improved cold chain, more syringes, better needles and better transportation in the form of mobylettes. However, animal health is more than vaccination. It includes rational deworming programs, effective antitrypanosomiasis treatments, improved nutrition, reduction in neonatal mortality and many other factors. While a few of these issues are already being addressed, with more support and initiative they would already have been dealt with and programs begun to solve them.

Efforts are concentrated almost entirely on cattle. Very little effort has gone into improving health in small ruminants or poultry. If the goal is to improve the diet of the rural population, it must be noted that the population is much more likely to get animal protein in the form of eggs, mutton, chevon, chicken or fish than beef. Augmenting the productivity of any of the first four will do more for the diet than will increased cattle production. The two ways that cattle production has the greatest effect on human diet is as animal traction or as a source of cash in order to buy grain.

The Project succeeded in establishing a functioning immunization system to protect the national herd from massive outbreaks, but more emphasis need to be put on livestock other than cattle.

*Establishment of Vaccine Control and a Serosurveillance Program.*

This objective, except for timely arrival of some supplies, has been well met. There are no deficiencies.

*Applied Animal Health Research Program and Improved Vaccine Production and Preservation.*

As previously noted, applied research is the backbone of agricultural production and productivity. Good research projects were initiated, but some were never completed, usually due to the lack of funds. Field trips could not be taken for lack of reliable transport or fuel. Equipment and supplies were too long en route because bureaucracy got in the way of accomplishment.

All research is expensive. Incomplete research is the most expensive because there is no payback. Agricultural research in the U.S. brought the average lactation rate from 12,000 lbs of milk/cow in the 1950s to over 16,000 lbs of milk/cow today. An increase of two tons of milk/cow required an enormous investment in research in genetics, feeding, reproductive physiology, milking technology, etc. In Mali the basics have been done, but adaptation and adoption must follow. It will take large investments in time, effort and money to bring about real changes in production and productivity in the livestock sector. If for no other reason than this, there should be a follow on project to Mali Livestock Sector II.

*Strengthening Animal Health Extension Services.*

Considering the enormous potential for improvements in the livestock sector, only a bare minimum has been accomplished. There does not seem to be an effective link made between research results and change in management practices. More opportunities need to be developed for exchange of information from researcher to extension agent to producer and back again. As mentioned previously, field agents need training in communications. The EIV, mentioned under "Animal Health Extension" uses bureaucrats from the various

divisions of the Project as guest lecturers. A greater integration of CVL and INRZFH talents and skills into the curriculum is one way to propagate the information that has been gleaned from research and testing.

### *Interactions with Other Projects.*

Development of an entity as complex as livestock production in all its forms in Mali is too big a job for any one agency to undertake. There must be co-operation among many groups, not only to share the burden but also to share ideas, methods and experiences. Cross fertilization is an important benefit derived from co-operation. Therefore, part of a project's success depends on how well it co-operates with other agencies involved in associated projects.

There are many opportunities for interaction in Mali because of the many projects and donor agencies present. PARC has focused on controlling the recent rinderpest outbreak through a vaccination campaign. ILCA has been doing animal production research in Mali for years. CMDT overlaps with the Project zone and has an excellent record in extension. Other more generalized groups such as Africare, the U.S. Peace Corps, Save the Children, Baptist missions, PIDEF, etc. are at least somewhat involved in animal production.

The co-operation between the different divisions involved in the Project and other donor agencies is not consistent. This is one of the Project's weak points. Relations between the Project (CVL) and PARC have been excellent. They have shared resources, expertise and results very well and both groups are better off because of it.

In some of its research projects CVL has been able to profit from collaboration with other agencies (a FED project in Madina Diassa and another near Sikasso) and at the same time, contributed to those projects by developing trypanosomiasis control programs fitted to the local conditions. Collaboration between ODEM and the Project has allowed the helminthology section to begin work on the epidemiology of liver flukes in the Delta with the eventual goal of being able to control them.

At the local level some of the agents of DNE have co-operated with the groups mentioned above on various projects such as poultry raising, work oxen management, milk goat breeding and management, fattening of cattle and small ruminants and forage production and preservation. At higher levels the official linkages are weak or nonexistent. This prevents cross fertilization from spreading beyond the point of contact. In the Interior Ministry (MTDB) there is a division that is devoted to NGO efforts. At the level of the DNE there is very little awareness of what the NGOs are doing. DNE should communicate with MTDB on a continuing basis to work with the NGOs involved in animal production projects.

## **CROSS CUTTING ISSUES**

### ***Women and Animal Health and Production***

African women play a very important role in agriculture. Unfortunately they are rarely in decision making positions and are rarely contacted by extension agents, who are usually male. It would seem logical that one avenue to follow in increased animal production would be to involve women in the program. Although this was not a specific goal of the Project, the effects on women are important and definitely affect its success.

Direct efforts to involve women would include their training and promotion within the divisions. At CVL two of the seven sections are headed by women and at least two other higher level women are employed in research sections. They have had the opportunity to go abroad for short term courses. In the DNE, women are employed at a minor managerial level in the fields of training and data management. There are a some women working in the field (35 of 387) at all levels (Post, Sector, and Region), but none in a position of responsibility. Before the Project began there were very few women at any level. Now, despite their numbers and education (veterinary nurse to veterinarian), their talents are being underutilized even in the positions they hold. In several cases we encountered, this seemed to have a demoralizing effect.

Other direct efforts to increase involvement of women would include extension interventions aimed at improving women's role in livestock raising. This has been done to some extent. Since small scale poultry raising is most often done by women, poultry projects often benefit women. To the extent that the DNE helps these programs by extending advice and manpower, the Project is helping women. There is, in the DNE, a section devoted to poultry production whose activities to a large extent were funded by the Project. The head of that section has been able to organize poultry producers and see to the distribution of information, vaccine, and improved roosters for cross breeding.

Another DNE-sponsored intervention at the local level that has benefitted some women is sheep fattening programs at some sectors visited by the evaluation team and possibly in others. Headquarters tends not to be fully aware of this involvement in the field.

The Project has also been of benefit to women indirectly by raising the family standard of living. Cattle fattening is an example. Despite a concern expressed in the midterm evaluation, we found no evidence that cattle fattening generally consumed a significant amount of women's time. Improved health of the family's work oxen through better nutrition (stored fodder, forage planting) and protection against trypanosomiasis is another example. These effects are still small and the latter effect is more important outside the Project zone where CVL collaborated with two FED projects. An INRZFH/ILCA milk production program near Bamako is increasing the quantity of milk

available, but baseline data collection rather than benefits assessment has been the major activity to date.

In summary, women have benefitted to some extent because of the Project. The benefits could have been and could be much greater with a slight change in emphasis from cattle to small animals and a greater focus by DNE on using its female cadre effectively, especially as extension workers, in reaching out to other women.

### ***Animal Improvement***

Livestock improvement was omitted in Project design. Many reports mention the need for work in the area of animal improvement, but neither the mid-term nor the subsequent internal evaluations flagged the need for improvement of the animals that are the subjects of research, extension, health care, management and institution building. Animal health and nutrition must be improved before animals can achieve their inherited potential, but this strategy is short sighted when no investment is being made in overall animal improvement.

The evaluation team has attempted to make the point that plant research, testing and eventual extension takes time even though a new generation of plants is produced each year. Malian cattle take anywhere from three to six years to produce one generation. If animal improvement work had begun at the start of the Project, there would not yet be significant results. It would be tragic if in order to catch up, the GRM suddenly decided to start crossing indigenous cattle with exotic breeds and this should be avoided.

The African ruminant has developed in a harsh environment and was selected primarily for its ability to survive. Little or no attention was paid to the development of important productive traits such as milk production, meat production, draft power, size, conformation, early maturity, short calving intervals or more efficient conversion of feed inputs. The survival characteristic is one of the most valuable characteristics of these animals and it should not be lost by cross breeding. It is very important that all improvement work undertaken by the GRM be done using local breeds.

The new trend in Mali is toward intensive farming combined with intensive animal husbandry. This requires animals with different characteristics from most cattle that currently are available. Some animal improvement work is being done at Niono and Yanfolila. A herd of Toronke' cattle and Toronke' goats have been purchased for observation and eventual selection for specific characteristics at the Toronke' Station. The focus and methodology of these three programs should be carefully evaluated to determine the validity of their objectives and if additional results can be obtained with little or no supplemental support.

### ***Small Ruminants.***

The August 1988 INRZFH/ILCA study "Livestock Production in Central Mali" reports ..."30% of milk offtake for human consumption is from small ruminants." The African Livestock Policy Analysis Network publication "Sources and Transfers of Cash Income In the Rural Economy: The Case of Smallholder Mixed Farmers in the Semi-Arid Zone Of Mali" reports the following percentages of income sources:

- |                          |                 |
|--------------------------|-----------------|
| ■ Non-Farm, 9.0%         | ■ Crops, 20.1%  |
| ■ Small Ruminants, 32.3% | ■ Cattle, 38.6% |

Although small ruminants are the source of almost a third of total milk and total income in the semi-arid zone, very little research and development are being done to improve the productivity of these animals. Although numerous types and breeds of goats have evolved in Mali through adaptation to local conditions or through crossbreeding with breeds brought into the country by travelers little or no systematic breeding for desirable characteristics has taken place.

### ***Recurrent Costs***

Several studies on the recurrent costs of animal health had been planned. None of these were done. An accounting student did a small evaluation of the vaccine production unit at CVL as her thesis for graduation. She was not able to separate out the costs of the various activities. To our knowledge no thorough study of the DNE recurrent costs has been done. For a discussion of ways to recoup expenses, see "Financing CVL Activities".

It is ironic that those activities that allow the GRM to recoup some of their costs are also the activities most amenable to privatization.

### ***Unplanned Effects and Unexpected Benefits***

The major unexpected benefit of the Project is the success of the cattle fattening program that was paradoxically eliminated halfway through the Project because of problems with the credit program. This was the cattle fattening (*embouche paysanne*) activity. When farmers could no longer obtain credit from ECIBEV, they went elsewhere to obtain cattle and continued fattening and selling cattle using the techniques they had learned. The concept has since spread to sheep fattening. Now that money left over from the ECIBEV account has been made available at commercial rates to producers through BNDA, so many people have asked for loans that the bank has had to ration the money. According to a bank officer, the effective interest rate is about 20% per annum.

Another unplanned benefit is the use of the Project supported laboratory to check the wholesomeness of drinking water and home prepared food such as dried fruit and dried meat. Another unplanned benefit to public health was CVL participation in the control of the outbreak of Rift Valley Fever in West Africa. CVL personnel had the expertise and equipment required to do the serology necessary to help confirm and control it. While the outbreak may have been stopped without the CVL assistance, its expertise was helpful.

A similar situation exists with the current discovery of the introduction of the screwworm into Libya. The two entomologists at CVL were trained at Texas A & M University. Because Texas was the last state cleared of the fly and the control program was based in Texas, they are acquainted with the problem and the control measures and can explain the details to the field agents who will be the first to become aware of the fly if it does enter Mali.

Using various means of storing fodder and feeding crop residues to oxen in corrals was meant to keep them in good condition for planting season when normally they would be at their poorest condition. In addition to that planned benefit, it was soon realized that the farmer also had more organic fertilizer than before because the oxen were confined and because the uneaten forage was mixed with the manure. This has allowed some farmers to reduce their dependence on purchased fertilizers.

Support by the Project to a DNE agent for poultry production has resulted in the formation of a 50 member poultry association in an area that supplies Bamako with much of its poultry and eggs. Vaccinating poultry as well as the concept of feeding chickens rather than letting them fend for themselves have been shown to be acceptable interventions. Poultry raisers are using such things as termites, rice and millet bran, smoked fish scraps, etc. to feed their flocks.

## *Training*

### *DNE.*

Emphasis was placed on overseas short term training since long-term training is very expensive. Also, long-term participants have almost all deserted DNE, although almost half of them are in areas somewhat related to their educations. The short-term training program was completed and a survey carried out which involved trainees and their employers. The survey concluded that both parties were satisfied. In-country training was provided for regional Veterinary Directors, the Heads of Veterinary Sectors and Veterinary Posts and for trainers. If women are to be integrated into the development process, it would be advisable to include them in these training sessions.

Long term training focused on animal science, skin and hides, animal nutrition, agricultural economics and agronomy.

Short term training focused on animal epidemiology, poultry production and epidemiology, extension, rural development design, management and evaluation.

One hundred two DNE agents received in-country training in animal health, computer manipulation, radio (RAC) operations and diagnostic techniques. Agents who participated in seminars are all satisfied with their experience and expressed interest in further seminars. The Evaluation Team noted through the contacts they made with producers that the improvement of field veterinary service delivery was due to training provided to field agents.

### **CVL.**

The agents employed by the DNE and CVL receive their initial training in one of two schools, *Institut Polytechnique Rural de Katibougou* (IPR) and *Ecole des Infirmiers Veterinaires* (EIV). The former gives a degree equivalent to a BS and the latter gives a degree roughly equivalent to a vocational/technical school. The EIV supplies the lower level field agents who work directly with producers. Up until 1983 its main orientation was toward animal health. At that time it changed course and began teaching production and extension courses. This year, if the new curriculum is approved, it will teach even more production. Part of the reason for the change is that the DNE, once the primary employer of graduates, is no longer hiring, so the school now prepares its students to be farmers and to work for other development agents. The World Bank, the school's primary sponsor, will terminate funding this year.

The IPR is funded by the Ministry of Education, but a council which includes representatives of the DNE controls the curriculum. The school is responsive to the needs of the MEE and there is no feeling within the DNE that there is a problem with the way the school is run.

Malian bureaucrats assigned to the Project have been able to continue their educations. This training, funded both by the Project and by other donor agencies, has raised the level of competence in the area of animal health to a high level. It appears that trainees are selected first by identifying needs in a particular position and then educating the person that happens to be in the job at the time. Although it may not always be the case in other areas, at CVL the trainees return to the posts for which they were trained and almost always stay in their fields. Only one has moved to an administrative position. There has been a movement from long term degree training to short term training in specific areas. This seems to be a good idea as M.S. and Ph.D. holders who have finished their studies provide a base of expertise. Now more emphasis can be put on specialized skills. The Project, or at least CVL, has coordinated well with other donor agencies in providing training.

In addition to training of Project personnel, there has been a certain amount of training provided by Project personnel (Table 2). This is effective and field agents contacted

by the evaluation team were well acquainted with the subjects dealt with by the seminars. Sometimes the lack of materials prevented them from following up on what they had learned from the continuing education seminars.

### ***Privatization***

A recent directive freed pharmacies from the requirements of price ceilings for drugs and enabled any officially approved person (i.e., a veterinarian or veterinary "engineer" in good standing with the veterinary association) to import and sell drugs at whatever price the market will bear.

A complete code for certification has not yet been worked out, nor is there a code of ethics or provision for cases of malpractice. The boundaries between governmentally supplied and privately supplied veterinary care have not been delineated.

Other areas that need attention are financial management training for veterinarians entering the private sector, access to credit to start private practices and regulations concerning safe and efficacious drugs and their use. In one area visited by the evaluation team, the drug depots maintained by the Sector had driven a private individual out of the pharmacy business. Now that prices are no longer controlled, that person is attempting to reestablish his business with a mobile pharmacy.

When marking the boundaries between governmental and private supply of veterinary services, the fact that some areas cannot support a veterinarian must be considered. Many government veterinarians supplement their incomes by doing private work after hours, mostly with regularly scheduled visits to herds on contract. If this practice were to be recognized and expanded, it would be a means of offering private veterinary service in areas that could not support a totally private veterinary practice.

### ***Construction***

The major piece of construction, the new diagnostic and research building at CVL, is finally ready to be occupied. The electrical system and all electrical equipment are now in working order with the exception of some air conditioners. There is a problem with the new centrifuges that were ordered, as discussed below. As soon as the painting and cleaning are finished, people will start to move in.

The water system at CVL was finished and put in use in 1989. The midterm report did not exaggerate when it mentioned the need for a road to the research farm. That need still exists as does the need to renovate the buildings on the farm where the lab animals are kept. They need to be wired for electricity (a transmission line runs by the buildings) and they need an improved ventilation system.

At the veterinary posts visited by the evaluation team it appears that the construction and renovation has been completed to everyone's satisfaction. There are places to store forage seeds, stockpile pharmaceuticals and vaccines, keep records, etc. Vaccination parks seem adequate. Where no government park exists, the local cattle owners have often built facilities.

### ***Equipment and Supplies***

If there is one place where the Project has been deficient, it is in the procurement and distribution of equipment and supplies. There are still problems with the syringes mentioned in the mid-term evaluation, although the problem of inappropriate needles has been addressed. Material for doing the serosurveillance has not been distributed to the sectors although the distribution is planned for the near future when a team can distribute the equipment individually and demonstrate its use. Unfortunately only 500 blood tubes are available and these are not nearly enough.

There are two sources of difficulty, both related to USAID and GRM procedures. The first is the long period from the time equipment and supply orders are made and when they arrive. This seems to be due to the number of authorizations needed to obtain supplies. Examples of this abound. The food microbiology section placed an order for supplies in 1989 which has yet to arrive. It is now using media more than five years past its expiration date. Some equipment ordered by the TA in pathology as soon as he began his long term assignment did not arrive until after he had left.

The second source of difficulty is that the bidding process not only takes too long, but too often results in inferior and inappropriate equipment being purchased. For instance, the old autoclaves at the CVL were manufactured by Amsco, cost \$25,000 apiece and had a triphasic motor. They were replaced by another brand that cost \$15,000 apiece but were single phase and therefore required three times as much current. That meant that operating costs were higher and that the electrical system could support only one autoclave at a time. A similar situation applies to the air conditioners installed in the new building at CVL. The complaints about the syringes in the midterm report were a product of the bidding process.

A new lyophilizer for the vaccine production unit that was recommended by Dr. Gourlay in June 1989, is finally out on bids. The production crew and repair people at the lab are well acquainted with the present Virtis lyophilizer and have some spare parts for it. A new lyophilizer is desperately needed for production of viable freeze dried vaccine. The lab director fears that if Dr. Gourlay's recommendation to buy the same brand lyophilizer is not followed, there will be problems operating and maintaining the new one.

## ***Financing CVL Activities***

Starting in 1991 the GRM will no longer pay for utilities at the lab. These costs, roughly 50% of vaccine sales receipts, will be borne by the vaccine sales. This is part of the trend toward self-sufficiency and privatization. In order to meet the challenges of privatization, CVL must cut costs and increase income. It has also created a vaccine marketing position to identify and develop markets for CVL products and potential products.

It is looking into transformers that compensate for peak and low usage during the day as well as different methods of generating steam for the autoclaves. Two more comprehensive steps must be taken. First, a study on the cost of vaccine production and distribution, diagnosis and research needs to be done. The CVL must determine where money is being spent. The study will identify the costs of each of the different activities, then identify areas where economies can be made.

Once costs are determined, areas where costs can be recuperated and the rates at which to do so can be established. The obvious is an increase in vaccine charges to cattlemen. Export of vaccine has begun with the price to customers set at about twice the price to the Malian livestock producer.

Other sources of revenue are fees for well water testing and for analyses of home manufactured products such as yoghurt and dried meat. Brucellosis, mastitis and parasite testing can be charged for. Product testing and research and development projects for pharmaceutical companies is an area to be explored. This has already occurred to some extent, but it could be expanded in the future when the new antitrypanosomal drugs and new bioengineered vaccines are being prepared for marketing. The financial study must be done first to tell them how to price their products, set up a modern accounting system to better track expenditures, and install a unified computerized accounting system.

Future donor assistance to the CVL should concentrate on helping the lab transform itself, both technically and administratively, to cope with the new economic situation.

Table 11.

**TRAINING - CVL**  
**Account of the training of researchers**

Long term

<u>Year</u>	<u>Degree</u>	<u>Subject</u>	<u>Institution</u>
1986	BS	Microbiology	Iowa State Univ.
	MS (2)	Parasitology	Texas A & M University
	PhD	Parasitology	Texas A & M University
1987	MS (3)	Entomology	Texas A & M University
1988			
1989 MS		Microbiology	

Short term

<u>Year</u>	<u>Time</u>	<u>Subject</u>	<u>Place</u>
1986	4 mos	Microbiology	Ames, Iowa
	4 "	Microbiology	CDC
	2 "	Trypanosomes	Bobo Dioulasso
	3 "	Management	Pittsburgh
	1 "	Diagnosis	Nairobi, ILRAD
1987	6 mos	Pathology	Kansas State
	6 "	Virology	Washington State
	4 "	Quality Control	Ames, Iowa
	1 "	Immunology	Brussels
	2 "	Trypanosomes	Bobo Dioulasso
	3 "	Hemoparasites	Nairobi
1988	2 "	Bact Isolation	
		Pathology (2)	INRSP
	1 wk	AIDS/ELISA (2)	INRSP
	1 "	RVF	
	2 mos	TseTse Control	Vom
	1 "	Trypanosome/ELISA	Nairobi
	1 "	Reagent Preparation	"
	1 "	Tryp Diagnosis	Bobo Dioulasso
1989		Hematology	INRSP
		ELISA	CVL
	3 wks	Tryp Control	The Gambia
	3 "	Tryp Diagnosis	Kenya
	3 mos	Fluke Epidemiology	Denmark
	3 "	TseTse Control	Austria
	2.5 "	Poultry Pathology	England
	3 "	Immunology	Kenya

## **Recommendations**

### ***Recommendations until End of Project***

In general, cooperation among Project components should be encouraged and supported through the end of project. Transportation problems should receive attention in all activities in order to allow all levels of the institutions involved to carry out their mandates. A careful economic analysis of Project impacts should be performed at the end of the Project. This should be preceded by studies on mortality rates of cattle by cause of death, the number and profitability of cattle feeding enterprises for the past five to ten years and adoption rates for improved forage product technology by farmers.

#### ***Management Activities.***

Expatriates who have been involved with the MDST should work with Malian staff to identify training, introduced procedures and policies which have been effective within the MDST itself. Once these factors have been identified, MDST personnel should consider the operations of the institutions and services involved in the Project and pinpoint both where these improvements are most needed and where, among these locations, they can most easily reintroduced. For example, Project financial activities have been well managed by the MDST. It has also developed and maintains effective procurement and inventory control procedures. Those who work on these functions should assure that the systems are codified and help to identify ways in which the MEE could use or adapt some of these procedures and systems. This will also help inform the management information system specialist in the design and installation of the MIS as well as assist in the identification of future donor-funded activity in training and institution building.

An MIS specialist should work with the MDST to design and install the management system. Information should be disseminated throughout the institutions and services involved as to how the MIS can *assist* personnel in their work, as well as to its potential and its limitations. Given the short amount of time before the end of Project, provision should be made for follow-on training and support of the MIS. Recommendations which relate to institution building and MIS presented in reports prepared for the Project by Kraidy, Provonost, Poulin and Desjardins should be consulted.

MDST should assist in expediting the acquisition of supplies and equipment and the timely completion of any construction or repairs to Project financed structures which remains to be done.

### ***Animal Production.***

Research in and pre-extension of improved practices for animal nutrition should be recognized as successes, given the time frame in which they have been developed. Research and extension should continue through the remainder of the Project.

Field agents should assist village associations to identify, assemble and manage groups of high producing goats. A simple program of production and progeny testing should be developed that can be managed by a village association with a minimum of supervision from the extension service. After a few generations the association should have increased its herd production significantly and be in a position to sell breeding stock at a premium price to other associations or farmers. Since this activity requires almost no inputs, it could be begun during the last year of the Project.

### ***Animal Health.***

Current activities should continue through the remainder of the Project. CVL/DNE personnel should concentrate on the identification of areas where cooperation and collaboration with other divisions such as INRZFH could enhance and amplify their own work. When agents, researchers and veterinarians have identified these areas, CVL, DNE and INRZFH Division Heads as well as MEE officials should work out strategies and organizational accommodations to make this possible. Likewise, those involved with animal health activities on a day to day basis should continue to identify other donor projects and activities which carry out similar work. An institutional procedure to propose or introduce collaborative efforts should be worked out as should an institutional procedure to evaluate and act on such proposals.

Every effort should be made to expedite the delivery and installation of laboratory and research equipment and supplies ordered under the Project.

### ***Recommendations for Future Livestock Sector Activities***

The final evaluation team recommends that USAID/Mali continue to support project activities in the livestock sector, as originally envisioned at the outset of the Mali Livestock II Project. Introduction of an innovative management scheme helped avert copious problems encountered in earlier livestock sector projects. Significant progress was made in identifying, researching and beginning extension work with improved animal production practices and improvement of animal nutrition. Measures taken to improve animal health including prevention, diagnosis and treatment are well established and animal health practitioners are beginning to take interest in broader livestock sector issues and activities. Thus, a start has been made in the identification of major issues and needs within the livestock sector and Project strategy in addressing these through support for management, animal health and animal production activities has been effective in further defining specific

approaches and actions needed to achieve Project goals. A basis has been established for future Project activities. Following are recommendations as to what these should be.

### ***Management Activities.***

Future project activities in the livestock sector will require the same type of management support as required by the Mali Livestock Sector II Project. This includes planning, procurement, financial management, logistic support and monitoring and evaluation activities. Policies and procedures have been and continue to be worked out within the MDST structure to perform these functions. Job descriptions and procedures still need to be institutionalized, but preliminary work has been done and areas of weakness and need identified. Performance has been superior to that of management of previous livestock projects. Therefore, the MDST concept should be included as part of future livestock sector projects.

Effort should be made to encourage the involvement and employment of GRM personnel who have experience with these operations while continuing the current Director of Operation's strategy of cycling Ministry and GRM institutional personnel through the various MDST functional areas. MIS training should be an ongoing activity as the system becomes operational and expands into the various institutions active in livestock sector efforts.

Technical assistance should include a Director of Operations experienced in management and as dedicated to the idea of participation and technology transfer as is the current Director. A Malian counterpart to the Director of Operations should be identified and there should be a clear understanding that expatriate assistance with MDST operations is limited. Malians involved in MDST operations should participate in establishing a time frame within which adequate training and experience will be achieved in order to eliminate outside assistance with management components. This will not only impart a sense of ownership of the MDST as an institution, but also strengthen and operationalize planning skills and serve as a practical, hands on application of the kinds of capabilities which are being developed within the MDST.

Beyond its management function, the MDST might serve as the institutional site for policy discussion, debate and formulation. In this sense, MDST has the advantage of its past and present experience in liaison and coordination among the various Project components and its currently neutral status in the scheme of Project operations. Its reputation as facilitator could be put to good use to establish it as a central point where experts, officials, donors, private sector interests and project beneficiaries could converge and engage in the dialogue necessary to inform policy decisions and build consensus.

MDST facilities and capabilities could also be used to provide technical inputs including data, its analysis evaluation to be used in presenting policy alternatives. As such, it could draw on the expertise of all concerned with livestock policy, both public and private.

MDST's position, with connections to various ministries and departments, but without attachment to any one of these, is an ideal point from which to coordinate interaction and to disseminate information. This could be particularly important to discussion of privatization issues.

### ***Livestock Production.***

The final evaluation team has made the point that more emphasis should be put on the development of small ruminant and poultry research and extension components. Improvement in the production of these animals have far greater potential than the improvement of cattle, which have received the greater amount of attention to date.

The GRM should design a long range livestock improvement program which includes all types and classes of farm animals. Actions to be taken should include:

- The collection, inventory and evaluation of research and reports relative to animal improvement and performance that has been done in Mali.
- The survey and inventory of existing breeds of Malian livestock, specifying breed characteristics. The same information should be obtained for livestock in neighboring countries.
- The evaluation of animal improvement work currently in progress in Mali.
- The definition and specification of desired breed characteristics and performance standards for all types and classes of farm animals.
- Selection of foundation herds and institution of a program of performance testing, selecting and culling.

Although production trials of local strains of cow peas have been conducted, little has been done to determine the potential value of local legumes as soil improvers, forage producers and for use in range management or pasture production. A continuing search should be undertaken by all field staff to collect and identify wild local legumes. A gene bank should be established in the sub-humid and semi-arid zones for preservation of the respective species. These species could be available for trials under improved environmental conditions, comparison of characteristics with other varieties, genetic improvement, crossing with other legumes and other appropriate research.

Recognizing the constraints to use of rhizobium as a broad based input in isolated farming areas, research on the value of inoculating legume seeds should continue. This should include traditional forage legumes as well as leuceana, gliricidia and other legume forage trees. Testing the value of nitrogen and phosphorus fertilizer use in the sub-humid zone should continue.

Researchers have identified selenium and copper deficiencies in cattle. Feeding trials should be conducted to determine the importance of these elements in the diet as well as the economics of supplementary feeding.

Emphasis should be put on improvements and intensification of extension agent training in extension methods. This could best be accomplished by training a small group in extension techniques who could then train fellow agents in in-country seminars.

A major constraint to successful extension and adoption of cultivars which have been identified by research is the lack of seed. There is no seed multiplication capability in Mali, which presents a great risk to farmers who currently save seed from season to season. A particularly poor growing year could mean disaster for these farmers. Development of a seed farm or small seed industry presents opportunity for privatization.

### ***Animal Health.***

#### **The Diagnostic Network**

Some diagnoses currently made are based solely on gross examination, with no virus isolation or serology to back up interpretations of findings due to lack of reagents for particular tests. There should be a continual upgrading of the diagnostic capabilities, including not only training, but also supply of necessary reagents. Many diagnoses can be made using relatively unsophisticated equipment. Identification and training of an agent for each Sector and equipping the Sector office for those techniques could allow more diagnoses to be confirmed.

#### **The Animal Health Campaign**

The Animal Health Campaign is tied in with research, extension and privatization. Work should be done to

- Identify and map diseases which cause significant animal loss
- Emphasize work with small ruminants and poultry which are the source of animal protein in the average person's diet.
- Improve field agent training to enable them to communicate better practices to improve animal health.
- Inform and familiarize animal health specialists on production problems and issues.
- Facilitate privatization by allowing government veterinarians, at least in some parts of the country, to charge for services.
- Upgrade the extension capabilities of the field agents through the EIV's continuing education program.
- Make better use of national radio as a vehicle to disseminate livestock production, marketing and health information.

- Create incentives and opportunities for field agents who introduce and maintain effective extension programs.
- Sponsor field days and conferences by both research entities (CVL and INRZFH) for the benefit of the field agents and producers.
- Disseminate information such as livestock prices and other information of immediate concern to livestock producers.

### **Vaccine Quality and Serosurveillance**

The only changes to be made here are the timely supply of functioning, appropriate vaccine production equipment. Allowing the CVL vaccine production unit to charge a fair price for its products and expanding the line of products will not only ease the financial burden on the government, but will also reduce reliance on imported vaccines and may produce export earnings. This would also use the excess production capacity that now exists. A short term visit by an experienced poultry vaccine production specialist to assess vaccine production problems is recommended.

### **Applied Animal Health and Vaccine Research**

More support needs to be given to applied animal health and vaccine research. Encouragement of collaborative research which involves other funding sources such as drug and agrochemical companies, USDA, private foundations and European governmental agencies can help spread the costs. Continuing development of both people and procedures are necessary and should be supported. This includes both continuing education in more advanced techniques as well as the materials, reagents and equipment necessary to do them.

Areas of concentration should be epidemiology of liver flukes, causes of neonatal deaths of all ruminants, appropriate anthelmintic treatment strategies for different management systems and different climatic conditions, control of brucellosis, vector research to cover biting flies other than tsetse, more emphasis on heartworm and its vector Amblyomma spp., and examination of the relation between transhumant cattle and the ticks that affect them.

In addition to supporting research programs directly, reference material available at CVL needs to be improved. Lab animal facilities at the CVL need upgrading. This latter point, mentioned in the last internal evaluation, should be a fairly high priority since the ability to supply an adequate number of healthy animals directly affects the vaccine control, antigen preparation for research and vaccine production sections.

### ***Crosscutting Issues.***

The overall strategy for livestock sector development should be modified to support more directly productive interventions earlier in the effort. Successful productive elements can provide incentives and maintain morale in the process of livestock sector improvement. Results are more visible and accessible to more project participants than are those for institution building.

### **Reference Library**

A well-stocked, well-organized National agricultural, animal production, veterinary, research library should be established. One of its mandates should be to seek out and catalog research done in the past. To the extent possible, this should include work done in neighboring countries. It should make contact with all the international research centers, appropriate foreign universities and overseas manufacturers, requesting to be put on their mailing lists.

### **Development of the Private Sector**

The 1988 "Study of the Business Climate in Mali" provided three major recommendations. The first of these is as follows:

USAID/Mali should continue to focus its efforts on improving conditions in the productive agricultural sector that are conducive to private sector involvement in the production, commercialization and export of agricultural products. This will entail the following steps:

- Continue the support of village associations which enable farmers to access the formal sector credit institutions.
- Privatize the commercialization process and gradually place the delivery of agricultural inputs, machinery, and other services (for example, veterinary services and tree nursery management) in private hands.
- Improve the transportation infrastructure to permit the efficient and timely marketing of goods for export.
- Provide assistance where possible and at reasonable levels, to individual rural agribusiness projects aimed at creating and processing export products.
- Continue to strengthen the ability of the village associations to store their harvests properly until the optimal selling time. Help to ensure that the private commercial sector has the capacity to market the products.

The other two recommendations, to continue the Economic Policy Reform Project and to provide technical assistance to businesses and enterprises to bridge the gap between the formal and informal sectors, are vital to this effort.

One strategy for private sector livestock development in Mali could be called the "bottom-up, top-down" approach. On the top-down side, the GRM policies and regulations should be revised to create a favorable business climate. It should support or establish an institution which would facilitate the formation of agribusiness enterprises. This could include assistance in performing feasibility studies and preparation of business plans, special training and technical assistance, understanding import-export procedures, obtaining financing and completion of applications and forms and assuring compliance with applicable legal regulations. Such an institution should be staffed with business oriented planners and implementers. Wherever feasible, agribusiness enterprises should provide for participation by farmers and stockmen through linkage contracts and options to purchase shares in the agribusiness firm (see ANNEX VIII).

The bottom-up side would involve assisting and promoting farmer and herder associations. These associations, some of which would evolve into cooperatives or farmer owned corporations, could enter into marketing and group financing activities. Formation of credit and thrift societies could mobilize rural capital and help to break the "cattle as a store of value" syndrome. There are indications that stockmen are beginning to see merit in cashing in some of their animals for other forms of assets (vehicles, equipment, etc.).

Promotion of rural banks is another approach by which to begin the process of monetization of the rural sector. This is not to say that one will soon hear talk at the weekly market about the current rate on CDs, but there will be talk about alternative investment opportunities which will bring the greatest return.

Privatization of publicly funded services and activities in the livestock sector should be a primary consideration in future project design. Seed and pharmaceutical production are obvious areas where opportunities exist and private sector enterprises can be established. Research activities are much less likely to be commercially viable. Responsible consideration of project components and strategies, based on dialogue among GRM officials, private interests, producers, USAID/Mali and any other parties with a stake in the future of livestock activities in Mali, is recommended. Careful analysis of issues resulting from dialogue is necessary. Among choices is the continuation of project support to those activities which, by virtue of their contribution to public good and their inability to produce revenue, confine them to the public sector while relegating components for privatization to other USAID/Mali projects or other types of support. Alternatively, USAID/Mali livestock sector projects may concentrate solely on privatization and commercialization. Or, a mixture of public and private support may make up a future USAID/Mali livestock sector project. Whatever the case, decisions which draw on USAID/Mali Program priorities and GRM objectives must be made before the next phase of livestock sector project activity.

### **Policy Formulation**

Land tenure, marketing, taxation and resource allocation policy constraints must be addressed. USAID should facilitate and encourage the confrontation of these policy issues to the extent of its ability.

## **ANNEXES**

<b>ANNEX I</b>	<b>Scope of Work</b>
<b>ANNEX II</b>	<b>Survey of Participants - Long Term Responses to Questionnaires</b>
<b>ANNEX III</b>	<b>Cattle Fattening Component Review</b>
<b>ANNEX IV</b>	<b>An Assessment of The Financial Management Component of The Livestock Sector Project in Mali by Francois Doamekpor</b>
<b>ANNEX V</b>	<b>Animal Production: Inputs</b>
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## **ANNEX I**

### **Scope of Work**

#### **Mali Livestock Sector II Evaluation Scope of Work**

**I.** With regard to the overall feasibility, effectiveness and validity of the project implementation arrangements as described in the Project Paper Supplement (the 8th Amendment), the contractor will assess the following:

- A.** The validity of Project goal and purpose.
- B.** The validity of linkages at input to output and output to purpose levels (i.e. are inputs sufficient to achieve outputs and are outputs adequate to achieve purpose).
- C.** The validity of the major assumptions.
- D.** Any major assumptions not identified in the Project Paper Supplement Logical Framework and their significance in terms of Project feasibility.
- E.** The validity of the EOP Benchmarks and the progress toward meeting them.

**II.** With regard to the assessment of Project performance, implementation, and progress within the four Project supported activities, MDST, DNE, CVL and INRZFH, the contractor will assess the following:

- A.** The general Project organization and performance of Project decision makers (USAID, and MEE) and the contractors (USDA and Chemonics).
- B.** The progress made toward realization of outputs and purpose.
- C.** MDST: It has as a goal the improvement of the management capability of Ministry Departments working with the Project. With regard to MDST the contractor will assess the progress made toward improving the Project management and financial management capabilities of the Project's technical services and the areas in need of improvement. Specifically the contractor will assess the following:
  - 1.** The coordinations and integration of Project resources across service divisions.
  - 2.** The institutionalization of management and financial practices.

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3. Adoption of improved management and financial system. Specifically, the contractor will determine to what extent appropriate management and financial systems for Project monitoring and implementation have been adopted at DNE, CVL and INRZFH.
  4. The appropriateness of the management information system (MIS) and the progress made in its implementation.
  5. The functions of MDST most appropriate for integration within the MEE and a suggested schedule of actions to effect this integration.
  6. The viability of the current garage operations and a suggested program for garage services and vehicle maintenance.
- D. DNE: The Direction Nationale de l'Elevage has as its principal function the delivery of health services to livestock owners. The Project supports DNE function in Regions I, II and the District of Bamako. During the course of the final two years of the Project (FY 90 and 91), the DNE is to enlarge the scope of its activities by improving its diagnostic capabilities in animal health and undertaking extension activities in animal production. With regard to DNE the contractor will assess the progress made toward:
1. Adequacy and appropriateness of provision of supplies, equipment and vehicles to improve animal health including impact of the improved cold chain for vaccine delivery in Regions I and II. A specific question to be addressed is, "Are the individual veterinary posts adequately equipped to perform their assigned functions?"
  2. The effectiveness of the radio network established for reporting of animal health problems.
  3. The diagnostic capabilities of field agents.
  4. The implementation of extension activities being undertaken by field agents in animal health (excluding vaccinations) and animal production.
  5. A specific task will be to analyze and synthesize DNE's view regarding its role in extension and how that role may be carried out.
  6. Coordination with other projects within the zone.

**E. INRZFH:** Under this Project the Research Institute is responsible for research activities on appropriate technical packages to provide year round, nutritive forage for livestock in the semi-arid and sub-humid project zones. With regard to INRZFH the contractor will assess the progress made toward:

1. Execution of research studies, forage production and animal feeding tests, socio-economic analysis, etc. As provided for in the Project Paper Supplement.
2. Constraints in the development of documentation of research results for extension purposes.
3. A specific task will be to analyze and synthesize the Institute's view regarding its role in extension and how that role may be carried out.
4. There is a proposal to merge and reorganize the Livestock and Agronomic Research Institutes. At the same time a 12 year research program and six year Action Plan are being developed. The contractor will examine the new organization and long term plan to assess its appropriateness.
5. Coordination with other projects within the zone.

**F. CVL:** The principal activities which the Project supports at the Central Veterinary Lab are improvement of diagnostic capabilities, institution of a sero-surveillance Program and animal health research. With regard to the CVL, the contractor will assess the progress made toward:

1. Improvement in diagnostic and research capacity in the areas of virology , helminthology, microbiology and protozoology.
2. Adequacy of sero-surveillance activities and principal constraints.
3. Development of protocols for prevention and control of disease.
4. Qualitative improvement of vaccine production unit.
5. Specifically the contractor will assess the major constraints toward making the CVL a self-sufficient unit. The contractor will also make a determination as to what functions of the CVL will require continued financing by the GRM and what functions may require further financing by USAID.

**III. Other Issues.** The Project was also concerned with a number of issues and activities which have cross-cutting impacts:

- A. Sustainability.** The contractor will assess the following:
  - 1. What Project benefits are likely to be sustained after donor funding ends.
  - 2. What local institutional capacities (management, technical, financial provisions for maintenance and replacement of capital equipment, the garage) are being developed to continue Project benefits? What policy conditions are required to facilitate continued long-term impact?
  
- B. Women and Development.** The Project Paper Supplement called for specific actions to better defined the role of women in livestock protection systems. Specifically, the contractor will assess progress toward:
  - 1. Increased training opportunities for women, especially women field agents, in animal health and production extension.
  - 2. Work with women producers on improved animal health and production packages.
  - 3. A more thorough and accurate assessment of the role of women in animal health and production.
  
- C. Participant Training.** The contractor will make an assessment of the effectiveness of the long term training. Specifically, the contractor will interview a selected number of returned participants and their supervisors to determine how the participants' performance has or has not been influenced by the training which the participant received.
  
- D. Local Training.** The contractor will assess the effectiveness of the following local training seminars, specifically:
  - 1. Documentation network.
  - 2. Diagnostic training for field agents.
  - 3. Computer training for department participants.
  - 4. Vehicle, communication and cold chain maintenance.

**E. Recurrent Costs.** The contractor will assess progress made on recurrent cost issues with regard to the delivery of animal health services.

**F. Privatization.** The contractor will assess the progress of the Veterinary Privatization Program and examine constraints remaining for implementation of private veterinary practice. The contractor will make recommendations regarding the implementation of private veterinary practice.

**IV. Assess unplanned effects and lessons learned.**

**A.** The contractor will identify any unexpected results or impacts such as changes in social structures, environment, technical or economic situation that have affected the outcome of the Project. The contractor will also determine and describe advantages and/or disadvantages of these changes.

**V. Recommendations.** The Contractor will provide recommendations for sound areas of investments especially in animal health, animal production and management for a follow-on project. The contractor will provide recommendations on design, implementation and management of future livestock projects.

## ANNEX II

### Survey of Participants - Long Term Responses to Questionnaire

**1. What training did you get?**

Ph.D. in Livestock Economics  
Ph.D. in Veterinary Science  
M.S. in Agricultural Economics (2)  
M.S. in Range Science  
M.S. (field not stated)

**2. Where do you work?**

DNE (2), CVL (2), Livestock Research Center, ICARDI (formerly worked at DNE upon return from training)

**3. What preparation did you have before training?**

No response (1), M.S. (1), English course (2), Engineer Polytechnic Institute of Katibougou (1), Five years in research (1)

**4. How has training helped your present position?**

Nothing.

Better conduct research activities.

Larger perspective in the future.

Since I have been back, I am not that actively involved in the different activities. This might be due to the fact that new programs are not suited to the interim period the project is experiencing right now.

My training has helped me develop a good understanding of rural development problems. I also improved my skills in the planning, monitoring, and economic analysis of agricultural projects through academic courses and seminars.

It made me more at ease in initiating and carrying out field and laboratory diagnosis and research work.

**5. Are your training and your job related?**

Yes (3)

Not very much.

Qualified yes.

No (1)

**6. Did training give you an advancement in rank?**

No (4), No response (1), Yes, my training gave me an opportunity to be advanced in rank according the laws of the civil service, even though it was not that significant.

**7. What training do you need that you didn't get?**

Nothing (3)

No response (1)

Need some in remote sensing.

Ph.D in immunology.

**8. How long did the training take?**

4 years, 2 years, 30 months (3), 3 years

**Were there any problems with the training?**

No (4), No response (2)

**9. Was the training appropriate?**

Yes (5), No (1)

**10. Were there problems with readjustment to a new job?**

Yes (1), No (5)

**to Malian conditions?**

Yes (3), No (2), There were problems with readjustment to Malian conditions because I did not get the job related to my training.

**11. If you have a similar job, what improvements in your activities did the training do?**

Improvement in policy design approach, in the analysis of policies, and in diagnosing constraints. No response (2)

If I had a similar job, I would put more emphasis on managing the natural resources in terms of forage production. Within a country where common grazing is the rule, it is difficult to optimize livestock production through small scale forage production when the population is great need for food.

I noticed a net improvement in my skill of assessing project impacts when I was called upon to the evaluation of the livestock program of the project ODIPAC"; "the training improved my skills in the diagnosis of vector borne parasites.

**12. What changes did you notice in conditions here from the time of your departure until your return?**

None (1), Not much (2), No response (2), Everything was going downward.

Restructure of the research side of the Project.

Activities are kept to their minimum mainly in the semi-arid zones.

The process of cashing money for the execution of programs is very slow, putting in danger the efficient execution of the different activities.

Lack of motivation.

**13. Did you need long-term training or would you have gotten the same from short-term training either in or out of Mali?**

Yes (4), No (1), No response (1)

- 14. What training is still needed by other people in your area of expertise? What areas of expertise are weak and what should be done to correct the weakness?**

Economics, policy design and analysis and marketing.

No need to look into serology for sero epidemiology and sero diagnosis of, or example, nematode infections.

The weakness is in the area of economics related to livestock.

Basics and concepts of range management and forage production, mainly with perennial legumes.

Its impacts on soil fertility or management under our traditional livestock or farming systems in relation to our land use.

We have a tendency to draw a line between animal and range forage while they should be inter-related. The plant/animal interface in relation to environmental factors is the key to a sound range management and consequently to sustainable livestock production. Different weaknesses could be corrected through long and short term training of people in charge of those programs.

DNE needs a reorganization and the responsibilities of each staff member should be clearly defined.

More advanced training in vector borne parasites diagnostic technique.

- 15. Considering the whole livestock sector, what needs to be done to increase production and income of the producers?**

Improved feed availability, credit system and removal of marketing constraints.

Encourage private investment and set up efficient marketing network.

Improve genetic potential, improve nutrition, implement good health care policy. Once production is increased, markets are needed to secure that production and increase income of the producers.

- 16. What has Livestock Sector II project done to increase producers income?**

Improvement of cattle health and reduction in disease risks.

Not enough information to answer. (3)

I don't know much about this Livestock Sector II.

Has contributed to increased livestock numbers by handling some of animal diseases. It has also permitted initiation of producers to new feeding technique, mainly in the areas of hay treatment and crop residues for better animal production. These two combined approaches have increased in a certain way the producers' income.

Established a diagnosis network and make it more effective. Make the producers participate more in livestock improvement programs.

17. What problems does the Livestock Sector II project have and how would you suggest resolving them?

Lack of specific policy objective identification in Mali is basically the problem that the livestock sector has. The remedy would be essentially the design of sound specific livestock national policies and related specific strategies in identification.

No response (4)

The administrative structure seems to be deteriorating and very heavy. Technically, the project deals with animal health and nutrition to increase mainly the number. On the other hand, nothing is done to increase producers' income by motivating them to sell. We need to look seriously at the possibility of creating a balance between price and product quality within a well organized market system so there could be a good de-stocking policy for better environment protection.

18. What is your feeling about the emphasis on Region I and II plus Bamako as opposed to the rest of Mali? What elements would you put into a livestock program anywhere in Mali?

More emphasis on animal production and marketing than currently.

These regions should not be given priority because they are not the only livestock raising areas.

Regions IV, V, VI and VII are also very important areas for livestock activities. The main elements should be livestock nutrition through sound rangelands management, animal health through prevention and treatment, efficient destocking policy with well organized market system within or out of Mali.

**A good strategy because other regions are covered by other agricultural or livestock projects.**

**No response (2)**

**19. Discuss your feelings about the collaboration of CVL,DNE, and research.**

**Weak collaboration.**

**Collaboration has improved in last two to three years.**

**Has been strengthened by better coordinating actions.**

**No response (3)**

**20. a) (for people in field) Discuss your support from and identify your main office in Bamako. What are their problems?**

**No one from field.**

**b) (for people in Bamako) Discuss how well the field staff communicates with headquarters and how well it performs. What are their problems?**

**Radio contact has improved communication quite well, however logistics remain a major problem.**

**Most of the problems of our field staff are taken care of by people going on business trips.**

**Field staff regularly send off reports to headquarters but they complain about not receiving feedback to help them.**

**No response (3)**

**21. For a new project what would you add? What would you drop?**

**(Add) market extension and farmers credit program.**

**Emphasis should be on applied research.**

Range management for better exploitation of natural forage. Small scale forage production should be directed only towards selective animal types such as draft animals, milk cows, calves and sheep. Diffusion of research results should be role of DNE. Should not judge research on how many technologies have been passed. Need to know why our proposed technologies are not being accepted by producers.

I could answer this question in 1989.  
No response (2)

**22. What part of the livestock sector should be done by the private sector?**

The current animal health program (vaccinations).

All

Animal production by small private groups.

Fattening and commercialization.

Production of vaccines and medicines for livestock as well as animal feeds.

Product marketing.

No response (1)

**How would it be implemented?**

By allocating financial resources to private veterinarians through contracts.

Through credit system.

By entrepreneurs with internal or external funding.

Private operators will ensure the export of meat, hide and live animals.

No response (2)

**What would be the government's role?**

Policy, design and monitoring

Coordinator/financial aid.

**Develop credit system.**

**Supervise and control the quality of products in relation to established regulations.**

**Sensitize producers. Assure animal protection. Inspection of processed products.**

**No response (1)**

**23. What has been done to improve the lives of women?**

**No response or don't know (4)**

**Make women take an active role in many sectors of our development.**

**We have just starting to have actions toward women, difficult to make an objective appreciation of the improvement of the life of women due to the Project.**

**24. What has been done to improve small ruminants or poultry?**

**Very little or no response (3)**

**Poultry has never been part of Livestock Sector II Project research. Small ruminants play a significant role in providing income to producers.**

**Some vaccination for poultry by DNE. Make small farmers understand necessity of protecting poultry against diseases.**

**Studies being done on small ruminant pathology, poultry farms increased in numbers in urban centers and vaccine production unit is underway at CVL.**

## ANNEX III

### Cattle Fattening Component Review

Cattle fattening or embouche paysanne was the only direct production component in the Project. Funding for this component was terminated at mid-term due to problems with the credit portion of the component.

The following are excerpted from the mid-term evaluation of this component:

"The cattle feeding credit program, implemented by the Agency for Credit and Investment in Livestock and Meat (ECIBEV) under this Project, was a carryover activity from the Mali I and II Livestock Projects. From 1975 the program conducted eleven annual cattle feeding campaigns. The objectives of these campaigns were to enable farmers to purchase thin adult male cattle during the annual dry season (January to April), when prices are low, and to feed and put these cattle on the market at a time when normal supply of cattle is much reduced and prices are therefore high. The farmers, hence, expect to derive their profits in feeding both from the actual weight gain in the cattle fed and from the seasonal fluctuation in cattle prices.

"The compensatory gains of underweight but otherwise mature cattle depends heavily on the feeding of cottonseed residue supplements from the HUICOMA cotton gin and oil extraction plant. Few substitute concentrates are available in Mali and, therefore, the current program is vulnerable to increases in the price of the cottonseed supplement, which may sharply reduce farmer profits. Otherwise, from the perspective of animal feeding and health, the program is technically sound.

"USAID and the GRM set forth three objectives in the Project Grant Agreement in carrying over the cattle feeding credit program to the current project:

- To transfer ECIBEV field support functions to three Rural Development Operations (RDOs) within the first three years of project implementation.
- To establish the financial self-sufficiency of the ECIBEV program, principally through improved credit fund operations.
- To improve ECIBEV's capacity to provide credit and livestock marketing support to its client farmers.

"The ECIBEV credit fund has shown marked improvements in financial reporting following the insistence of the MDST. However, in eleven years of operation, the credit program has succeeded in decapitalizing the USAID-supplied fund by 42 percent and the effect of this decapitalization is increasing steadily with program expansion. The interest

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rate charged on loans is far below the actual opportunity cost of capital in the Malian economy, and the existing structure of loan administration further penalizes farmers who pay their loans back on time while encouraging late or non-repayment of loans. Finally, the administrative overhead fee on cattle feeding loans falls significantly short of the actual total of variable and fixed costs incurred by ECIBEV in operating its program. This has negated any real possibility that the organization could be financially self-reliant by the end of the third project year.

"With respect to financial viability at the level of the farmer, project researchers calculate that net financial returns to participating farmers are highly variable from year to year and are increasingly suspect given sharply rising feed prices. At least 27.6 percent of participants in the 1984/1985 campaign -- which overall was the most successful to date -- did not make sufficient returns on the sale of their animals to cover their outstanding loans to the program. For the 1983/1984 campaign, this figure was 38.2 percent. Moreover, the present program excludes women from participation, except as unpaid laborers who may or may not derive some indirect benefits from the cattle feeding.

"In summary, the ECIBEV program has consistently failed to achieve its objectives."

#### Comments on Mid Term Evaluation Conclusions

It is the judgement of the final evaluation team that the planning and design of cattle fattening component was flawed from the start. A credit program should never be structured to result in effective interest rates as low as 3 or 4%. In addition, the problem of loan repayment may have been aggravated by the relative emphasis placed on increasing the program as opposed to loan repayment. Had the credit been channeled through the BNDA or other banks the results would likely have been much different.

Requiring ECIBEV to be self-financing was unfair at this stage in its development. It should have been regarded as a development organization, not a business. If it were to be a business, then its revenue should have been based on a profit share with the farmer. Instead, ECIBEV was supposed to cover its cost from finance charges to the farmer. This encouraged ECIBEV to promote more loans so as to increase their revenue.

The variability in profitability is explained by the fact that feeding cattle is an acquired skill. Some say it is more an art than a science. ECIBEV promoted the practice quite vigorously. As a result, many farmers were induced to get into the program and had to learn fast. It would not be unusual under these circumstances that many did not make money in the first year of participation. Also, it was planned that forage grown on the farm would be used to an increasing extent and in some instances substitute or supplement more expensive purchased supplements.

ECIBEV was making some progress in privatizing its operations but the pace was not fast enough to satisfy Project management. Statistics obtained from the RDOs and the

BNDA on their respective cattle feeding programs over the past four years show a sharp drop in this activity since 1986, the last year of the Project program.

Remaining credit funds in ECIBEV of 200,000,000 FCFA were transferred to BNDA in March, 1990. This is to be used for a new program of cattle feeding aimed especially at school leavers and cattle traders. Therefore, there will be a four year gap in the AID funded credit source.

The problem with relying mainly on bank credit to encourage more feeding is in the nature of the enterprise and its participating farmers. Capital requirements are high and there is a high perceived risk of death loss. The small farmer is reluctant to assume this risk and often can not raise some capital to add to the bank loan. An ideal situation would be agribusiness provision of animals, industrial feed and technology to the farmer on a profit sharing contract.

The economic analysis performed in 1982 showed this component of the project having the lowest B/C ratio (1.06) of the other components. However, this was a financial and not an economic measure. It would be conjecture to say that the perception of a barely marginal B/C ratio influenced decision makers in terminating the program.

Certain benefits such as manure were not included in the analysis. Some farmers reported that they would engage in cattle feeding for the manure even if they did not make money on the cattle. Project costs also seem high considering the assumed privatization after three years.

Given the above adjustments and changed assumptions, this program should show attractive economic returns.

In summary, this program was terminated on financial grounds, not economic. At best the decision to terminate was questionable; at worst, it was a mistake.

### Methodology and Assumptions

This analysis began with a farm cattle feeding enterprise budget. This showed a modest profit or return to farmers labor and management. Assumptions were then made on the number of enterprises which ECIBEV, the parastatal charged with implementing the activity (credit, buy/sell assistance, transport, health measures, etc.) could handle each year. Projecting this number times the net value added from the enterprise gave the total benefit. This was compared to the cost of ECIBEV and other inputs for 20 years rendering a marginally positive B/C ratio with a 12% discount rate.

Project planning called for the functions of ECIBEV to be assumed by producer and village associations and RDOs with training from ECIBEV. Yet the costs appeared to remain high throughout the Project.

The economic benefits should have been based on the added meat produced and marketed plus some value for taking animals off the range and saving some grazing resources. Another benefit would include value of manure produced. This is a very important consideration for a farmer. Some reported that they would engage in Embouche for the manure even if there were no profit on the animals.

Costs would be reduced considerably if ECIBEV were phased out within five years. Given these adjustments, the economic B/C ratio would likely be higher for cattle fattening component than any of the other components in the Project.

### Costs Associated with Cattle Fattening Component

Example of total financing cost for individual loan for Cattle Fattening:

Amount of loan	1,000,000 CFA
Duration	6 months
Interest rate	15%
FAD (social security)	1.75%
Commission (fixed charge)	20,000 cfa

#### Total cost of loan (1,000,000 CFA)

Interest for six months	75,000 cfa
FAD	17,500 cfa
Commission	20,000 cfa

Note: The loan is made March 1 when the lender receives 962,500 CFA (after deduction of FAD and commission).

He is to repay the loan plus the interest (1,075,000 CFA) on September 1.

FAD (*Fonds d'assurance*) rates depend on age of lender:

- 1.75% for lenders under 60 years of age
- 2.25% for lenders from 40 to 50
- 2.50% for lenders more than 50

The *commission de dossier* is 20,000 CFA if the loan is less than 5,000,000 CFA and 50,000 CFA if the loan is more than 5,000,000 CFA.

**ANNEX IV**

**An Assessment of the Financial Management  
Component of the Livestock Sector Project in Mali**

by  
Francois Doamekpor

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AN ASSESSMENT OF THE FINANCIAL MANAGEMENT COMPONENT OF THE  
LIVESTOCK SECTOR PROJECT IN MALI

A STUDY PREPARED FOR THE USAID/MALI

BY

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AN ASSESSMENT OF THE FINANCIAL MANAGEMENT COMPONENT OF THE  
LIVESTOCK SECTOR PROJECT IN MALI

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## ACRONYMS

AID	Agence du Developpement International Agency for International Development
BNDA	Banque Nationale du Developpement Agricole National Agricultural Development Bank
CVL	Laboratoire Central Vétérinaire Central Veterinary Laboratory
DAF	Direction Administrative et Financière Administrative and Financial Services Directorate
DNE	Direction Nationale de l'Elevage National Livestock Directorate
ECIBEV	Etablissement de Crédits et d'Investissement du Bétail- Viande Office for Credit and Investment in the Livestock Sector
ESDG	Equipe de Soutien au Développement de la Gestion Management Development Support Team
GRM	Gouvernement de la République du Mali Government of the Republic of Mali
INRZFH	Institut National de Recherches Zootechniques, Forestières et Hydrobiologiques National Research Institute for Animal Science, Forestry and Hydrobiology
JMC	Comité Conjoint de Gestion Joint Management Committee
FCFA	Franc de la Communauté Financière Africaine West African Franc
LCV	Laboratoire Central Vétérinaire Central Veterinary Laboratory
MEE	Ministère de l'Environnement et de l'Elevage Ministry of Environment and Livestock
MDST	Management Development Support Team Equipe de Soutien et De Gestion
PARC	Campagne Pan-Africain de l'OUA Contre la Peste Bovine OUA Pan-African Bindepest Campaign
USAID	see AID

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## EXECUTIVE SUMMARY

USAID/Bamako initiated this evaluation study. The title of the evaluation is "An Assessment of the Financial Management Component of the Livestock Sector Project in Mali". The evaluator carried out the study in Mali and wrote this report in the period August 31-September 17, 1990.

The Livestock Sector Project which is being evaluated is a follow-on of Livestock Projects I and II. Its purpose is to expand and continue testing activities that have increased production in Livestock I and II, and to develop institutional capacity in the livestock sector.

The purpose of this evaluation is to assess project implementation performance in the area of financial management and to recommend ways by which financial management practices can be improved, adapted and integrated into other ministerial departments.

The evaluation criteria used to assess performance included a comparison of budget limits with actual expenditure levels and a series of tests for accuracy, utility and adequacy of the information generated by the financial management system established for the project.

The methodology for gathering information included visits, review of records and interviews with project directors, staff and MEE officials.

### FINDINGS

Evidence gathered during the evaluation regarding the financial management aspect of the project has shown that the project has been well managed. The establishment of the MDST and its role in the implementation of the project largely contributed to this achievement.

It has been observed that the financial information generated by MDST is accurate and very useful since it has formed the basis for important managerial decisions regarding the project.

It was also recognized that project related activities in the volets have been promoted through MDST's support and supervision. More importantly, a lot has been accomplished in the coordination and documentation of project resources.

In the areas of internal control and use of resources, it was recognized that the accounting staff followed procedures and documented all transactions properly. For instance, most of the petty cash custodians documented all expenditures properly and accounted for cash balances accurately, with the exception of the CVL where the previous custodian still owes the fund 64,584 FCFA.

Regarding the credit fund for mobyette, the current credit system cannot be considered adequate. Its current reimbursement rate of 55% and interest-free policy on outstanding loans including principal amount would not provide for a self-sustaining credit program.

The garage has been fairly well managed. Its performance however, could be enhanced if current problems affecting its operations can be resolved in a timely fashion. Some of these problems include frequent shortages of spare parts and gasoline.

Nonetheless, given its current level of activity, the proposed study to re-assess its capabilities in preparation for other commitments might not be necessary. This is because, the garage now has enough resources including a quality labor force and equipment to facilitate an increase in its level of activity in the future.

With regard to the integration and institutionalization of MDST's financial and management practices, extra focus and resources might be needed to reinforce and sustain some of the benefits that have been derived from the project.

On the whole, the financial system is functioning as designed and is currently serving the purpose for which it was established. There are however, some weaknesses and areas in need of improvement. To address these weaknesses, a list of recommendations is presented below with the purpose of:

- o enhancing financial management practices and performance at the levels of the MDST and the volets,
- o assisting in the institutionalization and integration of MDST's financial management practices into MEE's respective units,
- o controlling operation cost, and

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- o ensuring effective internal controls and compliance with the AID accounting policies and regulations.

## RECOMMENDATIONS

### A. Improvement in Financial Management Practices at the MDST

The accounting and financial management system currently existing at the level of the MDST is good. It could however, be improved to enhance its overall effectiveness.

One way that this could be done would be to expose the accounting staff to new accounting methods--focusing on managerial and cost accounting including financial analysis. This objective could be achieved through short-term in-country training seminars. The duration of such a seminar would be at the discretion of MDST and management.

### B. Institutionalization and Integration of Financial Management Practices

Regarding the institutionalization of the financial management practices of the MDST, the evaluator would recommend that AID adopt one of three options.

The first option is to discontinue the financial and managerial support given by the MDST to the volets and to consider this unit closed as of September 30, 1991.

This is not however, an option highly recommended by the evaluator in view of the fact that a lot of resources has been put into building the capacity that MDST now has.

Since everyone involved in the livestock project wholeheartedly supported capacity building at the level of the MDST, it should now be possible for the volets to gain from the wealth of experience that has been acquired over the years. Therefore, dismantling the MDST at the end of September 1991, might not be a step in the right direction.

The second option is to give the project staff in the volets training in accounting and financial management. This could be done through short-term in-country training. At the same time, they could be given intensive training in the use of computers for financial data management and analysis.

This option might be cost-effective in the short-run given resource constraints, but integration would not occur since disparities currently existing between project activity areas and

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MEE's main accounting units would persist. This is also not an option recommended by the evaluator.

The third option may appear very ambitious but it is what is recommended by the evaluator because it would ensure institutionalization of MDST's financial management practices in the volets and facilitate the integration of the two systems.

As part of the development of institutional capacity strategy, the evaluator would strongly recommend that an integrated financial management program be prepared and implemented over the next two to three years. This additional focus would involve the following:

- a. An immediate exposure to and use of computers by all MEE's accounting staff before the end of year 1 through short-term in-country workshops. During this period, the staff would continually benefit from short-term training in accounting and financial management.
- b. By the end of the first year, a joint MDST and CVL staff, under the supervision of an external technical advisor (who would be around for only 6 months, under title 12), would focus on the:
  - o integration of the two systems of accounting to enable both project and MEE's accounting staff to work and share information,
  - o use of computers for accounting data management and analysis including cost and managerial accounting and financial and quantitative analyses,
  - o transfer of skills to all accounting staff in the MEE through workshops organized by the MDST.

The need for all accounting staff to benefit from cost and managerial accounting including financial analysis in the long run, may not be apparent at this time. For the CVL however, it is imperative and urgent, since as a parastatal it must build capacity beyond skills and knowledge in public accounting to become self-sufficient and independent.

For the others, DNE and INRZFH, building capacity now might help the staff plan, manage and implement future development projects properly.

### Why Use a Technical Advisor?

The use of an external technical advisor for this project is important for two reasons:

- a. to build the capacities of both the MDST and the volets' accounting staff beyond public accounting to include analytical methods of computation in accounting and finance,
- b. to harmonize differences and conflict that might develop during the initial integration process.

What makes this option more appropriate is the fact that the CVL has already been granted more than 20,000,000 FCFA to enable it conduct a study and to set in place a computerized financial management system. Therefore working in collaboration with the MDST from the onset might be a good idea.

After the project with the CVL is over, in six months, the MDST would move to other projects to replicate the results.

### Summary

The gist of what has been presented immediately above can be summarized as follows:

1. Expose MDST staff to cost and managerial accounting including financial and quantitative analyses;
2. Expose all volets accounting staff to the use of computers;
3. Expose volets and MEE accounting staff to financial management and analytical accounting;
4. Start integration and institutionalization program.

### C. Operation Cost

Appropriate measures should be taken to lower the cost of operation at the level of the MDST. Currently, this cost is more than 40% of MDST's annual budgets. This is too high and must be contained, especially, in areas such as salaries and benefits.

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One of the options for reducing operational cost is to discontinue the use of contractuels and to call on the GRM to increase the number of civil servants working for the project.

D. Petty Cash and Internal Control

1. All requests for cash advances by senior staff at the MDST, namely; the Director of Financial Services, the Chief Accountant and the Director of Administrative Services should be authorized and approved by the Director of Operations.
2. The real cash need of the petty cash fund, at the MDST should be re-calculated and the current limit thoroughly re-examined to determine whether it is too high.
3. All checks issued by staff as reimbursements for advances obtained must be quickly cashed by the custodian to replenish the account. These checks should not be kept for more than a week.
4. The previous custodian at the CVL should be made to reimburse 64,589 FCFA to the petty cash account as soon as possible. This amount represents a shortage discovered during the transfer of the petty cash account to the current custodian.
5. The custodian at the CVL needs a security safe to secure the petty cash documents and cash balances currently kept in a locked filing cabinet.

E. "Crédit Mobylette"

To maintain an adequate credit program the evaluator highly recommend the following:

1. All balances which have been in arrears for more than two months should attract an interest equal to the market rate.
2. A minimum fee should be charged for monitoring the credit program. The exact fee to be charged is at the discretion of management.

3. A premium equivalent to the risk of default, approximately 2,700 FCFA, should be paid by beneficiaries as part of their monthly instalments.
4. A mechanism should be set in place to re-possess the motorcycles after the sixth consecutive month of default.

F. Credit Program for Young Graduates

1. Appropriate steps should be taken to obtain enough information on the account to validate balances hand-written by the BNDA.
2. The GRM representative should monitor the operation of the account to ensure that the bank is following procedures and adhering to the terms of the protocol. This monitoring should be more rigorous and consistent than it had been in the past.

G. Garage Operation

1. Immediate action must be taken to minimize the cost of repairs and maintenance which represent important proportions of the project's overall recurrent costs.
2. For the future, provisions must be made for depreciation to facilitate the disposal and replacement of vehicles after the average useful life, which in Mali is between 3 to 4 years.
3. The problem posed by GRM's new directives regarding the project's tax-exempt status should be resolved quickly, to avoid paying 300 FCFA a litre for gasoline instead of 220 FCFA.
4. All authorizations for repairs of personal cars by the Director of Administrative Affairs must be co-signed by the Director of Operations. Also, hourly labor cost incurred by the garage must be reimbursed by the owners of such vehicles to the MDST for services rendered.
5. The contractual and personnel problems regarding two of the employees in the garage should be resolved in a timely fashion.

6. The current agreement between the MDST and PARC should be revised to the advantage of the project since labor cost could be reimbursed by PARC to MDST.

#### H. Procurement and Inventory

1. Roles in the procurement and storage unit at the MDST must be properly redefined;
2. The DBase III program must be re-installed to enable the procurement officer to record all transactions properly.

#### I. Accounting Manuals and Internal Control

1. All accounting staff in the volets should be given the opportunity to acquire accounting and financial management skills;
2. The same staff should be properly equipped and provided with computers to enable them use modern information management methods for accounting data management, analysis and reporting;
3. The current financial management manuals should be revised (it appears that steps are currently underway to do this) to include information on procedures.

#### J. D.A.F. and the Livestock Project

The procedure for check approval at the D.A.F. should be re-assessed and modified. It might be desirable to separate the activities required for authorizing project checks from other administrative duties to enable custodians to have checks approved and the petty cash accounts replenished promptly.

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## INTRODUCTION

### 1. The Purpose of the Evaluation

This evaluation focuses on the financial management aspect of the livestock project. Its purpose is three-fold:

1. to assess project implementation performance in the area of financial management including the use of resources,
2. to assess the extent of institutionalization of financial management practices for the development of the institutional capacity of Mali's public and private sectors,
3. to recommend improvement in financial management practices and ways by which these practices can be adapted and integrated into other ministries.<sup>1</sup>

### 2. Evaluation Criteria

To assess performance, a set of criteria was used, including:

- A. A comparison of the livestock project's initial budget limits with actual expenditure levels, since 1983;
- B. An assessment of the effectiveness of the financial system set in place at the levels of the Management Development Support Team (MDST) and the departments within the Ministry of Livestock (MEE), namely; the Central Veterinary Laboratory (CVL), the National Livestock Directorate (DNE) and the National Research Institute for Animal Science, Forestry and Hydrobiology (INRZFH).

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<sup>1</sup> See Annex 1 for complete Scope of Work.

For the purpose of this study, "effectiveness of the system" refers to the:

- i. accuracy of the financial information generated by the MDST accounting system,
  - ii. utility of this information for decision making,
  - iii. adequacy of the system to achieve the purpose for which it was established, and
  - iv. extent to which effective internal control is ensured, as required by Section 121 D. of the Foreign Assistance Act;
- C. An assessment of the extent to which previous recommendations of evaluators and auditors regarding financial matters had formed the basis for new decisions regarding project implementation;
- D. An assessment of the extent of:
- i. institutionalization of financial management practices in MEE's project related divisions, as demonstrated by staff performance and accurate interpretation of financial information,
  - ii. adaptation to and use of MDST financial information by the volets, and
  - iii. coordination by the MDST of financial activities between project divisions and other MEE's financial departments;
- E. An examination of policy factors affecting financial performance and project implementation.

### 3. Methodology

A series of steps were taken to achieve the above objectives. First, several background papers on the project made up of Joint Management Committee (JMC) and evaluation reports, AID technical papers and mission reports were reviewed.

Second, staff of the MDST and other units within the MEE were interviewed. In some cases, these interviews were supplemented by a short questionnaire.<sup>2</sup>

Third, the evaluator visited facilities under the supervision of MDST and MEE. During these visits, meetings and discussions were held with project staff and directors. At the MDST and the garage, stock records, vehicle log books and work orders were thoroughly reviewed.

#### 4. Organization

For the purpose of this study, the findings and results of the analysis will be divided into three chapters and organized in the following manner:

Chapter One: will consist of a historical analysis of the financial background of the livestock project. It will examine the underlying causes for budget modifications during the course of the project. It will also compare budgetary limits with actual expenditure levels and provide reasons for discrepancies, if necessary.

Chapter Two: will selectively review previous evaluations and will focus on some of their recommendations to determine whether recommended changes by evaluators in the past had influenced project implementation, especially in the area of financial management.

Chapter Three: will present results of interviews and discussions held with the project staff. It will also examine how current resources are being managed.

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<sup>2</sup> See Annex 2 for copy of the questionnaire used.

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## CHAPTER ONE

### FINANCIAL BACKGROUND AND BUDGETARY PERFORMANCE

The purpose of this section of the study is two-fold:

1. to provide a historical background of projected and actual expenditure levels during the life of the project, that is from 1983 till present,
2. to examine factors (both positive and negative) that have contributed to successful execution of proposed budgets or, have constrained performance over the years.

The ultimate goal is to determine whether the livestock project operation is likely to be on a financially sound basis, by the end of the project. It should be noted however that, the nature of the livestock project precludes any analysis involving the uses of financial ratios and balances on ordinary profit and loss account statements.

#### 1. Background

AID has been involved since 1963, in the development of the livestock sector in Mali. An initial loan of \$2 million for the construction of a laboratory in 1963, and for training Malian specialists to produce vaccines was reinforced by a major USAID support for the sector, following the Sahelian drought of 1974.

This significant assistance was the apparent beginning of the Mali Livestock I and II projects. Spreading from 1974 to June 1982, its purpose was to increase production and marketing of cattle through on-farm and commercial feeding as well as other interventions.

The current Livestock Project (688-0218) which began in 1983, as a joint effort of the Government of the Republic of Mali (GRM) and USAID is a follow-on of the Livestock I and II projects. It represents the first phase of a proposed 20-year collaborative effort by both sides. Its goal is to increase the revenue level and well-being of producers of livestock and their dependents.

## 2. The Initial Budget

On August 31, 1982, the Government of the Republic of Mali (GRM) and AID agreed to jointly finance this new project. Under this agreement, USAID was to contribute US \$17,585,000 with a PACD of September 30, 1987. Table 1 below shows a breakdown of the initial budget estimates for the first five years of the project (1983-1987).

A review of these estimates reveals that approximately 55% of the overall budget was earmarked for technical assistance and equipment. The major beneficiaries of the technical assistance budget were the MDST, the CVL and the INRZFH (as shown in table 2). During the period under review, technical assistance represented 68% of MDST's total budget estimates.

The fact that the estimate for MDST's technical assistance was higher than the projections for each of the volets is understandable. The original goal to build and develop capacity quickly to ensure successful project implementation justified the need for a high initial cost.

More specifically, the aim was to build capacity at the level of the MDST for it to serve as the center piece of the livestock project during implementation--acting to resolve managerial and financial problems, as and when required.

Currently, besides its role as a management support unit for the project, it serves as a liaison between the volets and the main funding agencies and decision making bodies such as AID, the GRM and the JMC regarding financial matters.

Construction cost represented an equally important proportion of the original budget. The main beneficiaries were the DNE, CVL and ECIBEV. CVL however, was the largest beneficiary with approximately 56% of the total estimated budget (table 2).

Against the background provided above, it could be said that the significant investment in these areas, namely technical assistance and construction during the early part of the project, underscored the need to build capacity and infrastructure.

TABLE 1  
Initial Budgetary Limits  
The Mali Livestock Project  
1983-1987  
(in million US\$)

<u>CATEGORIES</u>	<u>MDST</u>	<u>DNE</u>	<u>ECIBEV</u>	<u>CVL</u>	<u>INRZFH</u>	<u>Total</u>
<b>1. Technical Assistance</b>						
1983	685	20	190	395	362	1652
1984	740	30	208	444	404	1826
1985	498	30	151	490	290	498
1986	523	40	--	374	369	523
1987	574	40	--	30	333	574
<b>Sub-total</b>	<b>3020</b>	<b>160</b>	<b>549</b>	<b>1733</b>	<b>1758</b>	<b>7220</b>
<b>2. Equipment</b>						
1983	170	183	72	58	70	553
1984	25	286	59	123	75	568
1985	45	300	40	83	36	504
1984	--	275	22	133	28	458
1985	--	250	2	103	30	385
<b>Sub-total</b>	<b>240</b>	<b>1294</b>	<b>195</b>	<b>500</b>	<b>239</b>	<b>2468</b>
<b>3. Construction</b>						
1983	--	342	30	570	--	942
1984	--	332	--	538	--	870
1985	--	160	--	--	--	160
1986	--	--	--	--	--	--
1987	--	--	--	--	--	--
<b>Sub-total</b>	<b>--</b>	<b>834</b>	<b>30</b>	<b>1108</b>	<b>--</b>	<b>1972</b>
<b>4. Training</b>						
1983	124	81	81	70	96	554
1984	105	155	116	150	90	616
1985	--	188	110	148	35	481
1986	--	35	35	85	--	155
1987	--	--	--	25	--	49
<b>Sub-total</b>	<b>229</b>	<b>459</b>	<b>342</b>	<b>478</b>	<b>221</b>	<b>1729</b>

Table 1 (continued)

<u>CATEGORIES</u>	<u>MDST</u>	<u>DNE</u>	<u>ECIBEV</u>	<u>LCV</u>	<u>INRZFH</u>	<u>Total</u>
<b>5. Operational Cost</b>						
1983	60	15	30	100	50	255
1984	60	20	35	175	70	360
1985	50	25	35	200	75	380
1986	50	25	--	200	75	350
1987	50	30	--	75	75	230
<b>Sub-total</b>	<b>270</b>	<b>115</b>	<b>100</b>	<b>750</b>	<b>345</b>	<b>1580</b>
<b>6. Credit Fund (ECIBEV)</b>						
1983	--	--	400	--	--	400
1984	--	--	100	--	--	100
1985	--	--	200	--	--	200
1986	--	--	200	--	--	200
1987	--	--	300	--	--	300
<b>Sub-total</b>	<b>--</b>	<b>--</b>	<b>1200</b>	<b>--</b>	<b>--</b>	<b>1200</b>
<b>7. Evaluation/Follow-up</b>						
1983	10	--	--	--	--	10
1984	10	--	--	--	--	10
1985	170	--	--	--	--	170
1986	10	--	--	--	--	10
1987	--	--	--	--	--	--
<b>Sub-total</b>	<b>200</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>200</b>
<b>8. Studies</b>						
1983	102	--	--	--	--	--
1984	118	--	--	--	--	--
1985	71	--	--	--	--	--
1986	60	--	--	--	--	--
1987	49	--	--	--	--	--
<b>Sub-total</b>	<b>400</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>
<b>9. Contingency</b>						
1983	21	43	25	80	38	207
1984	19	55	28	96	42	240
1985	15	47	23	31	30	146
1986	11	26	29	26	32	124
1987	13	21	27	9	29	99
<b>Sub-total</b>	<b>79</b>	<b>192</b>	<b>132</b>	<b>242</b>	<b>171</b>	<b>816</b>

SOURCES: Compiled from MDST project financial records and technical papers in Bamako, Mali, for the period 1983-87.

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**TABLE 2**  
**Summary of Budgetary Limits (83-87)**  
**The First Five Years of The Livestock Project**  
**(in millions \$US)**

<u>CATEGORIES</u>	<u>MDST</u>	<u>DNE</u>	<u>ECIBEV</u>	<u>CVL</u>	<u>INRZFH</u>	<u>Total</u>
1. Technical Assistance	3020	160	549	1733	1758	7220
2. Equipment	240	1294	195	500	239	2468
3. Construction	--	834	30	1108	--	1972
4. Training	229	459	342	478	221	1729
5. Operational Cost	270	115	100	750	345	1580
6. Credit Fund	--	--	1200	--	--	1200
7. Evaluation and Follow-up	200	--	--	--	--	200
8. Studies	400	--	--	--	--	400
9. Contingency	79	192	132	242	171	816
<b>TOTAL</b>	<b>4438</b>	<b>3054</b>	<b>2548</b>	<b>4811</b>	<b>2734</b>	<b>17585</b>
	<b>*(25.2%)</b>	<b>(17.4%)</b>	<b>(14.5%)</b>	<b>(27.4%)</b>	<b>(15.5%)</b>	<b>(100%)</b>

\* Percentages in brackets

**SOURCES:** Livestock Technical Project and MDST  
Financial Records in Bamako, Mali.

**TABLE 3**  
**Budgeted and Actual Expenditure Levels**  
**For the Period 1983 - 1988**  
**Livestock Sector**  
**(in million \$US)**

	As of Sept. 1985		As of Sept 1987		March 88
	<u>Budgeted</u> <u>Amount</u>	<u>Actual</u> <u>Expense</u>	<u>Budgeted</u> <u>Amount</u>	<u>Actual</u> <u>Expense</u>	<u>Actual</u> <u>Expense</u>
Technical Assistance	7304	5622	7304	6900	6915
Construction	*2323	*2212	*3267	*3085	*3190
Equipment	2348	2226	2348	2199	2199
Training	1869	1018	1869	1550	1764
Studies	400	272	400	400	400
Credit Funds	429	429	429	429	429
Evaluation	200	20	300	234	234
Operation Cost	1764	681	2332	1645	2264
Contingency	**338	225	77	6	6

**Sources:** Compiled from records of MDST and AID technical papers on the livestock project, Bamako, Mali.

**Notes:**

\* Include other additions during the period. For details regarding increases over the period, see PIL Nos. 7, 16, 21, PIOT No. 688-0218-3-60082 and JV No. 688-86-48.

\*\* The contingency fund was decreased to supplement other line items in the course of the period.

Projections for evaluation and follow-up activities for the period 1983-1987, were added to the estimates of the MDST. As a result, its initial projections represented 100% of the provisions made for these two line items (table 2).

A comparison of the original budget estimates with real expenses during the period 1983 and 1987 reveals no major cost overrun. Infact, the contingency, made up of 15% of the various items, was decreased and reallocated to other line items as necessary over the course of the project (table 3). This efficiency is largely attributable to MDST's capacity to provide effective managerial, financial and logistics support especially during the early years.

The efficient use of resources during project implementation was also recognized by the mid-term evaluators who commended the management support team for its effectiveness.

However, there was an instance where actual expenses exceeded original projections. This overrun occurred in the area construction. For the project as a whole, by September 1985, 95% of the original estimates had been spent. This percentage rose to 132% by September 1987, and increased further to 137% as of March 1988 (table 3).

In other words, construction expenditures exceeded actual projections by 37% during the period. Part of this increase is attributable to the construction of a diagnostic laboratory for the CVL which over the years have had several budget amendments (see PIL numbers in table 3).

### 3. Operation Cost

The line item for operation cost requires a more thorough discussion and for that matter, has been given a special consideration in the overview of expenditure levels over the period.

In the context of the livestock project, operation cost is defined to include the following: local salaries and benefits, vehicle, building, furniture and equipment maintenance, gas, office supplies, insurance, oversea and local trips, uniforms, part-time labor, and bank charges.

Therefore, operation cost as an aggregate represents an important proportion of annual budgets. More importantly, salaries and benefits constitute a significant proportion of this aggregate.

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To throw light on this phenomenon, table 4 is presented below to show the percentage distribution of project staff. This is followed by table 5 illustrating the distribution of operational cost since 1983.

TABLE 4  
Project Related Personnel and  
Percentage Distribution of Employees  
As of September 1989

<u>CATEGORY OF EMPLOYEE</u>	<u>MDST</u>	<u>DNE</u>	<u>CVL</u>	<u>INRZFH</u>
Contractuals	25 (50%)	-	12 (24%)	13 (26%)
Civil servants	10 (2%)	373 (79%)	53 (11.2%)	36 (8%)
"Conventionnaires"	2 (100%)	-	-	-
Part-Time	-	-	-	20 (100%)

Sources: Compiled from information provided by MDST Accountant, DNE volet Accountant and CRZ Accountant, Bamako, Mali.

It can be seen from the above table that various categories of employees currently work for the project.

A clear line of demarcation must however, be quickly drawn between a fully paid project employee and a civil servant. The civil servant is an employee carrying out project-related activities but continues to receive monthly salaries from the GRM. Some of the employees in this category are paid only monthly benefits (called primes in French) by the project. A fully paid project employee is a contractual, who receives no remuneration from the GRM.

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"Conventionnaires" are neither contractuels nor civil servants. The difference between a "conventionnaire" and a contractual is in form only, and in the procedure of recruitment.

It was discovered during the review of records and interviews that the project had to recruit some of its employees on contract because the original proposal for the GRM to provide adequate local support staff fell through.

The percentages presented in table 4 above are important for two main reasons. First, contractuels earn slightly more than the civil servants. Second, this differential have had significant budgetary impact on program management especially, at the level of the MDST, since all:

- o contractuels are paid by the project;
- o salaries paid to contractuels are charged directly to MDST's operation cost account.

As a result, MDST's operation cost including salaries and benefits (as shown in table 5 below) have remained the highest in the group.

TABLE 5

Distribution of Operational Cost  
Salaries Only as of Sept. 1989  
(In Francs CFA)

	<u>Salaries</u> <u>and Benefits</u>	<u>Percent of total</u>
*MDST	129,528,641	59.4%
DNE	4,953,000	10.0%
CVL	10,697,749	21.5%
INRZFH	4,547,462	9.1%

\*Includes salaries for the garage.

Source: "Situation des Rubriques Budgetaires",  
MDST's financial statements for 1989.

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The above figures have increased since 1989. For instance, salaries and benefits for the MDST as of June 1990, were 157,468,862 FCFA, representing approximately 48% of its overall operation cost.

#### 4. Budget Modifications

In 1983 and 1988, two important budget modifications were made. These changes increased USAID's contribution by US \$5,635,000, thus bringing its total support to US\$23,220,000.

The first modification was made in July 1983, to increase the initial projection of US \$17,585,000 by US \$635,000. This increase was needed to supplement extra cost for technical assistance proposed for the MDST (US \$335,000) and the ECIBEV (US \$300,000). These additions increased the total budget to US \$18,220,000 and, extended the PACD by two years--from September 30, 1987, to September 30, 1989.

The second budget modification, consisting of a total increase of US \$5,000,000 was made on August 16, 1988. Its purpose was to finance the extra cost needed to extend the project through September 31, 1991.

Presented in table 6 below is the new financial summary resulting from these two budget amendments.

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TABLE 6

New Financial Summary as Per Amendment No. 8  
Livestock Sector (688-0218)  
 (US Dollars)

	<u>Previous Budget</u>	<u>Revised Budget</u>	<u>Total Increase</u>
1. Technical Assistance	7,304,000	8,548,087	1,244,087
2. Construction	3,267,557	3,267,557	0
3. Training	1,869,000	2,089,673	220,673
4. Equipment	2,347,659	3,225,646	877,987
5. Studies	400,000	515,000	115,000
6. Credit	429,707	0	429,707
7. Evaluation	300,000	418,664	118,664
8. Operating Costs	2,264,970	3,716,255	1,451,285
9. AID Project Support	0	250,000	250,000
10. Contingency (15%)	37,107	759,411	759,411
TOTAL	18,220,000	5,000,000	23,220,000

SOURCE: Project Authorization Amendment No. 8,  
Mali Livestock Sector.

5. The Final Phase (1989-91)

The extension of the project through September 1991, made it possible for new and complementary activities to be added. It also increased the chances of completing project activities on schedule and for achieving project goals as originally planned. Part of this budget representing estimates for 1990, is presented in table 7 below.

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TABLE 7

Project Budget By Activity  
MDST and Other Volets  
Fiscal Year 1990

<u>CATEGORY</u>		<u>AMOUNT</u> <u>US\$</u>	<u>PERCENT OF TOTAL</u>
1.	<u>Animal Health</u>		
	DNE	296,614	
	CVL	723,255	
	sub-total	1,019,869	36%
2.	<u>Animal Production</u>		
	DNE	75,549	
	INRZFH		
	(Semi-Arid)	86,473	
	INRZFH		
	(Sub-Humid)	185,376	
	sub-total	347,398	13%
3.	<u>Program Management-MDST</u>		
	Support		
	MEE/AID	167,000	
	Program		
	Coord.	920,490	
	Fin. Mgt	43,000	
	Logistic	86,026	
	SIG	220,000	
		1,437,506	51%
	<b>TOTAL</b>	<b>2,804,773</b>	<b>100%</b>

Source: MDST Financial Records, 1989  
Bamako, Mali

With the new budget amendments, no significant variations in percentage distribution are observable. MDST still takes up more than 50% of the overall estimates. As pointed out earlier, MDST's central position and role in the project tend to facilitate the attribution of cost for certain commonly shared benefits such as technical assistance and evaluation. Hence, its estimates are often the highest in the group.

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On the other hand, a thorough review of the financial resources at the disposal of the project, including funds yet to be released, revealed that a budget overrun might occur if current resources and expenditure levels remained the same.

Let us assume that current expenditure levels are maintained through 1990, and that all projections for this period (January 1 - December 1990) equate actual expenditures by the end of the year. In such a situation, the total budget amount needed for the period would be \$2,804,773 (Table 7).

A comparison of the estimates for 1990 with projections for 1991, reveals that expenditure levels for 1990 are about twice the funds available for all project activities in the coming year, that is for the fiscal year 1991. Given recent increases in annual budget estimates resulting from amendments discussed earlier, only US\$1,099,003 would be available. This includes the line item for contingency.

As shown in table 8 below, if expenditure levels for 1990 are maintained and no major cut in expenditure levels occurred, there could be a shortfall, especially in the area of operation cost. Table 8 below also shows likely balances on various line items for 1991.

TABLE 8

Final Budgetary Summary for 1991  
and Availability of Funds  
(in US\$)

	<u>1990 Estimates</u> <u>By Category</u>	<u>Available</u> <u>for 1991</u>
Technical Assistance	763,875	366,289
Equipment	505,855	11,612
Construction	70,939	0
Training	310,587	40,826
Studies	217,901	110,443
Cost of Operation	705,616	158,027
Evaluation	200,000	0
Contingency	0	411,806
	<b>TOTAL</b>	<b>\$1,099,003</b>

Source: Compiled from MDST Financial Records, 1989-91  
Bamako, Mali.

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The real size of the shortfall can be estimated as follows:

1. Using estimates for 1990 as a guide, let us assume that for 12 months (January 1 - December 31, 1990), US \$705,616 would be needed (table 8). If the project ends in September 1991, resources may be needed for only 9 months instead of 12.
2. All things being equal, the total needed to support the project's operation cost for the fiscal year 1991, would be:

$$(705,616/12) \times 9 \text{ months} = \text{US\$}529,212$$

3. The expected balance on this line item at the end of December 1990, would be US \$158,027 (table 8). The difference needed to meet obligations on this line item would be US \$371,185.
4. To this amount must be added, an estimate for the proposed reduction in force, if some of the current employees would have to be disengaged after September 1991.

It should be noted however that, the above computations and deductions were based on a series of assumptions, some of which might not hold. Nonetheless, a second look at the budget situation might be appropriate including a budget re-adjustment.

An appropriate budget re-adjustment might include the use of the contingency fund. Extra resources could also be transferred from unused balances on line items such as evaluation, training and studies.

#### 6. The Project's Financial Effect and Influence on Local Development

Between 1963 till the present, AID's contribution and support to the livestock sector in Mali has been remarkable. Stretching over two decades, this support has contributed in various ways to the growth of the livestock sector and to the increase in overall national output.

More specifically, the effects of AID's commitments on the local development scene can be viewed from three different perspectives. First, these expenditures have helped to build infrastructure needed to sustain development efforts and benefits in the livestock sector.

Second, the project has helped to develop the managerial and financial capabilities of mid- to senior-level officials from Mali. Third, these commitments and investment have created job opportunities for Malians and consequently contributed to the growth of output and income.

Among other things, the project has:

- o Facilitated the development of infrastructure, by reinforcing the technical structure needed by the MEE to protect animals from diseases and ultimately increasing the production and marketing of cattle.

The most beneficiaries of infrastructure building projects were the CVL and the INRZFH. For instance, with this infrastructure, CVL's capabilities for early intervention and control were enhanced.

- o Helped to build capacity through training of project staff, mechanics, a garage keeper and a number of civil servants. These individuals have benefitted from workshops and seminars organized during the life of the project.

The Financial Specialist who headed the development of the financial system in MDST for instance, organized a series of seminars and workshops for the benefit of Malians. During the period, approximately 10 seminars on the use of various financial management systems were held for about 200 participants from various ministerial departments.

Although the major focus of those seminars was on AID accounting procedures and methods, participants also benefitted from an exposure to general accounting principles and financial management practices. Because of this training, these participants could now do their work better.

#### 7. Sustainability of Benefits Derived From Expenditures

It is difficult however to say whether all of the units that have benefitted from AID support could sustain the gains generated by the project after the withdrawal of support.

On the other hand, there is evidence that much of these benefits could be sustained. In the case of CVL, part of these benefits could be sustained if the lab is allowed to recuperate current cost of production through slight increases in market prices for its vaccines.

Likewise, extra focus and resources might be needed to enable the volets to sustain some of the benefits derived over the years. What could be done to achieve this objective is presented below.

## 8. Recommendations

### A. Improvement in Financial Management Practices at the MDST

The accounting and financial management system currently existing at the level of the MDST is good. It could however, be improved to enhance its overall effectiveness.

One way that this could be done would be to expose the accounting staff to new accounting methods--focusing on managerial and cost accounting including financial analysis. This could be done through short-term in-country training seminars. The duration of such a seminar would be at the discretion of MDST and management.

Not only would these courses enable the staff to do cost analysis, they would also be exposed to new accounting techniques including methods of financial and quantitative analyses considered crucial for the management of self-sustaining projects.

These courses would enable the staff to:

- o determine the unit cost of production,
- o use financial ratios that are crucial for financial statement analysis and managerial decisions,
- o make accurate projections about future cash flows (not AID cash flows!), and
- o estimate properly benefits and costs attributable to future development projects.

It is therefore the recommendation of the evaluator that the staff be given the opportunity to develop their capabilities in areas other than public and AID accounting. This objective can be achieved through a series of short-term in-country workshops.

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B. Institutionalization and Integration of Financial Management Practices

Regarding the institutionalization of the financial management practices of the MDST, the evaluator highly recommend that AID adopt one of three options.

The first option is to discontinue the financial and managerial support given by the MDST to the volets and to consider this unit closed as of September 30, 1991.

This is not however, an option highly recommended by the evaluator in view of the fact that a lot of resources has been put into building the capacity that MDST now has. Since everyone involved in the livestock project wholeheartedly supported capacity building at the level of the MDST, it should now be possible for the volets to gain from the wealth of experience that has been acquired over the years. Therefore, dismantling the MDST at the end of September 1991, might not be a step in the right direction.

The second option is to give the project staff in the volets training in accounting and financial management. This could be done through short-term in-country training. At the same time, they would be given intensive training in the use of computers for financial data management and analysis.

This option might be cost-effective in the short-run given resource constraints, but integration would not occur since disparities currently existing between project activity areas and MEE's main accounting units would persist. This is also not an option recommended by the evaluator.

The third option may appear very ambitious but it is what is recommended by the evaluator because it would ensure institutionalization of MDST's financial management practices in the volets and facilitate the integration of the two systems.

As part of the development of institutional capacity strategy, the evaluator would strongly recommend that an integrated financial management program be prepared and implemented over the next two to three years. This additional focus would involve the following:

- (i) an immediate exposure to and use of computers by all MEE's accounting staff before the end of year 1 through short-term in-country workshops. During this period, the staff would continually benefit from short-term training in accounting and financial management.

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(ii) by the end of the first year, a joint MDST and CVL staff, under the supervision of an external technical advisor (who would be around for 6 months only, under title 12), would focus on the:

- o integration of the two systems of accounting to enable both project and MEE's accounting staff to work and share information,
- o use of computers for accounting data management and analysis including cost and managerial accounting and financial and quantitative analysis.
- o transfer of skills to all accounting staff in the MEE through workshops organized by the MDST.

The need for all accounting staff to benefit from cost and managerial accounting including financial analysis in the long run, may not be apparent at this time. For the CVL however, it is imperative and urgent, since as a parastatal it must build capacity beyond skills and knowledge in public accounting to be able to become self-sufficient.

For the others, DNE and INRZFH, building capacity now might help the staff plan, manage and implement future development projects effectively.

#### Use of technical advisor

The use of an external technical advisor for this project is important for two reasons:

- a. to build the capacities of both the MDST and the volets' accounting staff beyond public accounting to include analytical methods of computation in accounting and finance,
- b. to harmonize differences and conflict that might develop during the initial integration process.

What makes this option more appropriate is the fact that the CVL has already been granted more than 20,000,000 FCFA to enable it conduct a study and to set in place a computerized financial management system. Therefore working in collaboration with the MDST from the onset might be a good idea.

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After the project with the CVL is over in six months, the MDST would move to other projects to replicate the results.

### Summary

What has been said above can be summarized as follows:

1. Expose MDST staff to cost and managerial accounting including financial and quantitative analysis;
2. Expose all volets accounting staff to the use of computers, accounting and financial management techniques and practices;
3. Start integration and institutionalization.

### C. Operational Cost

Appropriate steps should be taken to lower the cost of operation at the level of the MDST. Currently, this cost is more than 40% of its total budget, which is too high and must be contained, especially in areas such as salaries and benefits.

An appropriate method for reducing this cost is to discontinue the use of contractals.

## CHAPTER TWO

### REVIEW OF PREVIOUS EVALUATIONS AND RECOMMENDATIONS

Important reviews have taken place in the life of the livestock project. These reviews included a mid-course evaluation completed by external evaluators in 1986, and an Aid sponsored audit in August 1989. Equally relevant are reports prepared by external consultants to the project including those of Michael Kraidy (1986) on "Institution Building", and Yves Poulin (1989) on "Information Management System".

The purpose of this section of the study is to summarize some of the important recommendations made by previous evaluators, consultants and auditors. The object is to present a summary of the steps that have been taken or are being taken to act on those recommendations.

For our purpose, important recommendations regarding the financial management aspect of the project will be reviewed from the following:

- o Mid-term Evaluation Report dated February 1987;
- o The Audit Report of August 1989; and
- o Kraidy's report (1986).

#### 1. Mid-term Evaluation

In its final report, the team of evaluators praised progress so far made on the Livestock Project. They pointed out that "project implementation efficiency and effectiveness have benefitted immensely from the accounting, financial analysis, logistics and work planning systems installed by MDST." It was also noted that significant progress was made in the transfer of management awareness and skills to mid and senior-management Malians within MDST.

However, the report made several recommendations regarding the financial management aspect of the project. Two of their recommendations are presented below, including comments regarding progress so far made towards the implementation of these recommendations.

- a. In regards to ECIBEV, the mid-term evaluators concluded that "Private livestock producers should be given more effective scope for decision-making in both production and marketing; and their financial requirements should be met by some mechanisms other than direct credit through a government bureaucracy, with all its bureaucracy." The team recommended that USAID/Bamako ceased further financial support to ECIBEV.

(Comment: The team's elaborate presentation of the case on ECIBEV and its recommendation led to the termination of the credit program.)

- b. The MDST should develop an accounting manual for use by all accounting staff.

(Comment: This manual has been developed and operationalized since 1989)

## 2. The Audit Report of September 1989

Three important recommendations were made by the auditors who examined the operations of the MDST and its volets. This audit covered the period August 1982 - August 1989. On the bases of their findings, they recommended that:

- a. USAID/Mali be reimbursed a total of \$5,410 by MDST. This amount represented costs and unexplained expenses on the books of MDST.

(Comments/explanation given by Director of Financial Services, MDST--All the charges questioned by the auditors resulted from what they considered to be excessive uses of spare parts over the period. Although no refunds were ever made to AID as recommended by the auditors, a more suitable system, according to the Director, has been installed since January 1990 to properly assign cost and use of spare parts to vehicles).

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b. the MDST should strengthen the project's internal controls. More specifically, the MDST should:

i. establish a comprehensive administrative and accounting manual.

(An accounting and financial management manual has been developed and operationalized since August 1989).

ii. institute an effective monitoring mechanism over project inventories, vehicle usage, fuel consumption, bank accounts and petty cash funds.

(MDST Financial Director's Comment--A lot has been done in these areas including the installation of a new system for recording fuel consumption and vehicle usage. For instance, since January 1990, MDST has developed the capacity for generating quarterly reports on gas consumption).

iii. redefine roles and responsibilities in the ordering, receiving and paying for goods and services.

(No progress has been made in the area of procurement--significantly unclear lines of demarcation still exist in the ordering of supplies, receiving and paying for goods and services. More specifically, the answer to the question, who does what?--is still missing).

iv. establish procedures for prompt follow-up and recovery of the project's revolving fund loan account balances.

(MDST Financial Director's comment--adequate and proper accounting mechanism and procedures have been installed to recover project's revolving fund loan account balances).

c. MDST should:

- i. comply with the Malian Social Security Laws and withhold proper amounts from employees' contribution.

(Comment by MDST Financial Director--this anomaly has been corrected and is not likely to occur in the future).

- ii. carry out recommendations of the USAID/Mali biannual reviews under section 121 D. of the Foreign Assistance Act.

(Improvement has been made in some areas of internal control).

3. Michael Kraidy (1986)

Writing on the institutionalization of the Management Development Support Team (MDST), Kraidy recounted constraints and bottlenecks impeding the institutionalization of the MDST into the MEE. He cited a lack of decentralization as the cause of the constraints.

In his recommendation, Kraidy (ibid) reiterated the need for a directed effort to institutionalize the MDST within the Ministry and to delegate responsibility of implementation to a qualified individual.

(Comment-- Extra effort is needed in this area. Although a lot in terms of benefits has been gained, a new focus might help sustain these benefits.)

## CHAPTER THREE

### USE OF RESOURCES, INTERNAL CONTROL AND COORDINATION

#### 1. The Petty Cash Account

MDST and each of the volets (except the DNE) maintain a petty cash account. The maximum amounts allowed on these accounts are 750,000 FCFA, 500,000 FCFA and 450,000 FCFA for the MDST, the CVL and the INRFZH respectively.

A project accounting staff, working under the supervision of the chief accountant maintains appropriate accounting records. These records include:

- (a) a cash register--showing dates, recipients/payees, and amount of each transaction. This register also keeps records of cash advances received by project staff;
- (b) a listing of monthly expenses and records of request for replenishing the petty cash.

Separate meetings were held with the officers responsible for the petty cash fund in each of the volets and the MDST. The purpose of these meetings was three-fold:

1. to ascertain the validity of the balances shown on their books,
2. to determine whether appropriate procedures were followed in processing all petty cash transactions,
3. to ascertain the accuracy of the information generated by the system set in place to enhance effectiveness and accountability.

The ultimate goal is to determine whether with minimum supervision the volets could be self-sufficient and independent in the area of financial management.

(a) The MDST

A spot check was conducted on September 5, 1990, to reconcile the balance shown on the books and the actual cash on hand. Prior to this check, two separate meetings were held with the petty cash custodian to review internal methods for processing all petty cash transactions.

The spot check did not reveal any discrepancy. In all of the cases, proper procedures were followed and transactions were adequately documented. Authorizations were also obtained for all transactions. Presented below is a summary of the balances on the account as of September 5, 1990:

<u>Petty Cash Balances</u>		
<u>MDST as of September 5, 1990</u>		<u>Amount</u>
1.	Current Cash Balances Outstanding	160,000
2.	Staff Members Repayment of Advances Obtained by Checks:	
	a. dated July 11, 1990	65,000
	b. dated August 11, 1990	30,000
	c. dated August 24, 1990	40,000
	d. dated September 1, 1990	75,000
3.	Actual Purchases for the Office as of September 4, 1990	29,065
4.	Actual Count of Cash on Hand	350,935
	Total	750,000

From review of records and discussions with the petty cash custodian, it could be concluded that there was enough transparency in reporting including evidence of adequate supervision.

The purpose of the summary presented above however, is to illustrate some other important procedural issues. First, in accordance with the current practice, authorizations for cash advances by staff members with liquidity problem require the final signature and approval of the Director of Financial Services. This is an acceptable procedure since it falls within the scope and guideline for keeping the office petty cash.

However, an important question arises when the Chief Accountant, the Director of Financial Services or the Director of Administrative Services requires a cash advance. Who must authorize such a request?

It will be completely out of line for these officers to approve their own cash advances without the consent of their superior or, the approval of a higher officer. This issue is important for two main reasons:

- (a) cash advances obtained by staff members sometimes represent important proportions of the total cash account balance--approximately 45%, as of September 5, 1990,
- (b) the Director of Financial Services and the Chief Accountant are both supervisors of the petty cash custodian.

Under such circumstances, it might be appropriate for their requests to be approved by the Director of Operations at the MDST.

Second, it was discovered during the review of records that checks paid out to the cashier as refunds for advances obtained by the staff were not immediately cashed to replenish the fund but held for an extremely long period of time. Two examples can be seen from the table presented above--where, two checks dated July 11 and August 11, 1990, respectively were not cashed as of September 5, 1990.

The fact that these checks were not cashed on time presupposes the following:

- o either, there were no provisions made by issuers of these checks for them to be cashed promptly,
- o or, that the resources locked in those checks were not immediately needed to replenish the account, which

brings into question the original limit of 750,000 FCFA set for this fund.

Is this amount too high for the MDST, given its average cash needs? From calculations, it was obvious that, this amount is too high. For instance, the average cash need for a month, during which the account is balanced for replenishment is about 50% of the current cash limit. This excludes advances given to staff members in the course of the month.

(b) CVL

A similar check was conducted at the CVL to determine whether:

- i. there is proper separation of duties, and
- ii. the accounting staff has been following correct procedures and keeping proper records in compliance with Section D. 121 of the Foreign Assistance Act.

In terms of separation of role and duties, two employees are responsible for the project account. Although they work mainly for the livestock project, they also carry out other assignments. One of them is the petty cash custodian. He is also the person in charge of the stock room. The other member is a support staff, providing assistance as and when needed to the main custodian.

Despite a slight lateness in the posting of entries into the main journal, it was discovered that the staff followed procedures in most cases. Replenishments were made in accordance with approved procedures and most of the transactions were adequately documented and authorized by the respective Directors.

However, no evidence of control and supervision by the MDST could be seen on the books. Also, dates on invoices and other supporting documents were completely different. Obviously, the procedure to request three pro-forma invoices before making a purchase was not being followed.

Regarding the balance on the petty cash fund, it was short by 64,584 FCFA. The shortage was supported by a promisory note signed by the previous custodian to refund this amount by October 1989. This shortage was discovered when the fund was being handed over to the new custodian.

C. DNE and INRZFH

Both the DNE and the INRZFH have petty cash accounts. In the case of the DNE, replenishments are made through the custodian under MDST's control and supervision but actual disbursements are made in the regions by officers who submit regular statements and invoices to account for advances received.

The custodian at the INRZFH replenishes his account regularly at the level of the MDST and operates directly under the supervision of the MDST accounting staff.

A review of records has shown that procedures were followed and entries were made properly. However, entries made in the main journal were not regularly balanced and counter-signed by the MDST accounting staff. Cash balances and records at hand were all accurate at both the DNE and the INRZFH.

On the whole, petty cash transactions at the MDST and in the volets have been fairly documented. There are however, certain aspects that could be improved for a more effective internal control.

Recommendation

To ensure effective internal controls in compliance with AID accounting procedures, it is recommended that:

1. All requests for cash advances by senior staff, namely; the Director of Financial Services, the Chief Accountant and the Director of Administrative Services, at the MDST must be authorized and approved by the Director of Operations.
2. The real balance on the petty cash especially at the MDST must be redetermined and the limit thoroughly reconsidered with the following question in mind. Is the petty cash fund limit too high?
3. All checks issued by staff as reimbursements for advances obtained must be quickly cashed to replenish the account. This should not exceed a week.
4. The previous custodian at the CVL should be made to reimburse the 64,589 FCFA to the petty cash account as soon as possible.
5. A new security safe should be procured for the current petty cash custodian at the CVL.

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6. All journals should be regularly checked and signed by the accounting staff at the MDST.

2. Credit Programs

Two credit programs are currently operated at the level of the project. One of these programs is managed by the MDST in collaboration with D.A.F. It is designed to assist project employees to acquire their own means of transportation. Project employees are given new "mobylette" at the retail price and are allowed to repay the exact cost of the "mobylette" on instalment basis, at the end of every month.

The second program is under the supervision of the MEE. It is derived and updated from the old cattle feeding credit program which was discontinued due to a problem of decapitalization. The balance on that program (the defunct cattle feeding program) approximately 200,000,000 FCFA was transferred to the GRM to start this new program.

Operated by the B.N.D.A., its purpose is to assist young graduates to start their own investment. For the purpose of this study, this account will be reviewed briefly since its monitoring is under a different authority.

A. "Crédit Mobylette"

The program was originally designed to serve as a revolving fund to enable every member of the project team to acquire his/her own means of transportation. So far, the first batch is the only group to have benefitted from the program.

As of June 1990, 29,037,764 FCFA<sup>3</sup> were still outstanding on this account. The largest creditor volet was the DNE with 45% of the total debt outstanding--13,273,780 FCFA. This is followed by INRZFH's outstanding amount of 7,592,585 FCFA. The MDST and CVL each owes 4,522,529 FCFA and 3,387,150 FCFA respectively. Although ECIBEV is non-existent, it still owes 261,450 FCFA to the fund.

The fund's bank balance as of July 25, 1990 is 20,244,786 FCFA. There is a stock available as of June 30, 1990, worth 366,607 FCFA. Given the total repayments made so far, the credit program's rate of recovery, as of September 16, 1990, is only 55%. It is important to note that some of the outstanding balances on this account are as old as 4 years.

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<sup>3</sup> Data derived from MDST document with cover memo dated September 5, 1990, on "Situation du Fonds de Crédit Mobylette" signed by the Director of Financial Services.

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Discussions with project staff have revealed that several reasons underlie the large default rate. First, it was discovered that deductions from staff payroll of monthly instalments due on the account are often based on employee benefits. Its implication for repayment is simple. Anytime a cut in benefits occurs, as happened in a few cases, repayments are bound to fall behind.

Second, the credit program was meant to support the project staff only. It was observed however that, beneficiaries other than the project's own staff members participated in the program. Since these employees are currently outside of the scope of influence of the MDST, which is the main monitoring unit, significant controls can hardly be exercised over their repayment behavior.

Third, transfers of employees from one department to the other or, from one region to the other posed a major problem, thereby rendering repayment arrangements difficult if not impossible.

Fourth, the fact that some of the employees are paid by checks at the end of the month, and are allowed to cash their checks in order to reimburse the fund encourages non-payment and reduces the chances of debt recovery.

At the current rate of reimbursement, this credit system cannot be considered adequate because:

1. reimbursements by employees have not been made in a timely fashion;
2. no effective debt recovery system is currently in place to enforce prompt repayment;
3. employees other than those on the project have been equal beneficiaries of the credit program;
4. monthly deductions are based on benefits and not on gross salaries;
5. the interest-free policy on outstanding loans including principal amounts would not provide for a self-sustaining credit program.

Although the project could build upon the existing credit system by modifying its current most deficient aspects--which have resulted in non-reimbursement of principal amounts and late repayments, a revised credit system might be more appropriate and self-sustaining.

This new system will be more effective in influencing the repayment behavior of staff who will benefit from the program. It will also serve as a security or guarantee of some sort against risk of default.

### Recommendation

As a new credit policy, the evaluator highly recommend the following:

1. All balances in arrears for more than two months should attract an interest equal to the market rate.
2. A minimum processing fee should be charged for handling and monitoring. The exact amount to be charged is at the discretion of management;
3. A premium equivalent to the risk of default should be charged and paid as part of beneficiaries' monthly instalments. This premium can be calculated as follows:

Assume that the rate of reimbursement is only 60% and that the remaining 40% is the equivalent of say 20,000,000 FCFA. If the average duration of this debt is 36 months, it is possible for all beneficiaries (assuming 200) to share this risk factor over the period.

Hence the monthly payment by each beneficiary against the risk of default would be:

$$\frac{\text{Likely loss from non-repayment (20,000,000)}}{200 \text{ beneficiaries} \times 36 \text{ monthly payments}}$$

$$= 2,700 \text{ FCFA}$$

In light of this, it might be desirable to extend the period of this debt to minimize the severity and impact of repayment on the clients.

4. A mechanism should be set in place to facilitate the re-possession of the "Mobylette" after the sixth consecutive month of default.

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B. Credit Program for the Young Graduates

As pointed out earlier, this program is not of major importance to this report. This is because its monitoring is the responsibility of a GRM's representative. Therefore only a brief review is included to provide background information on how it is being managed by the B.N.D.A.

To gather information on the program, an initial contact was made with the GRM representative responsible for monitoring the program. During this meeting, documentation and information on the following were requested:

- o the date the credit account was opened at the BNDA,
- o total interest paid by the bank to the account in accordance with the protocol,
- o commissions and interest earned on the account by the BNDA since it was opened,
- o the due date for all outstanding loans,
- o copies of bank statements on the account.

The representative complained of a lack of information. He pointed out that he never received any of the above cited documents from the bank. When the bank was contacted by this official, the information presented in Table 9 below, which was hand-written by the BNDA, was given to him. A copy of this hand-written statement is in Annex 3.

Since no bank statements were examined by the evaluator to corroborate information provided the B.N.D.A. and the actual balance on the account, evidence of reimbursement can only be superficially discussed.

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TABLE 9Status of BNDA's/MEE's Credit Program

	FCFA
Total amount of initial loan	67,525,000
Total amount due September 1990	39,513,245
Reimbursements including interest payments	33,273,675
Balance to be Reimbursed by Sept. 90	6,239,912
Balance due on January 1, 1991	30,000,000

Source: Hand-written Statement Submitted by the BNDA.

The above information suggests that the unverified reimbursement rate is about 84%. This excludes the total amount of 30,000,000 FCFA due on January 1, 1991.

Request by the evaluator for extra information from the bank to determine whether interest earned was paid to the account as originally proposed in the protocol was highly resisted. More importantly, the fact that the GRM representative did not receive monthly statements summarizing activities and interest payments on the account meant that monitoring had not been rigorous in the past.

Recommendation

1. Appropriate steps should be taken to obtain enough information on this account to confirm the validity of the balances hand-written by the BNDA.
2. The GRM representative should monitor and follow-up on all issues regarding the operation of the account to ensure that the bank is following procedures and adhering to the terms of the protocol.
3. The representative of the GRM monitoring the program should do a more rigorous monitoring to enforce compliance on the part of the BNDA.

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### 3. Garage Maintenance

MDST maintains a garage which oversees the operation and running of approximately 43 vehicles. As a central garage, it repairs all project vehicles and stocks all parts necessary for the smooth running of these vehicles.

The garage has 12 staff made up of one garage keeper, assisted by a store keeper who maintains records of spare parts purchased and used. There are 5 mechanics, one electrician and four trainees. Therefore, in terms of manpower, the garage has well above its current needs.

There is a fleet of vehicles maintained by the garage and distributed among MDST, the volets and MEE, as shown in Table 10.

TABLE 10

Distribution of Vehicles  
As of September 17, 1990

<u>CATEGORY</u>	<u>NO. OF VEHICLES</u>	<u>TYPE AND NUMBER</u>
CVL	6	2 Landrover 2 Landcruiser (Toyota) 2 Peugeot
DNE	*17	1 Peugeot 1 Toyota 15 Landrover SW
MDST	12	2 Peugeot Soubachée 5 504 Break 2 Landrover 1 Bedine Peugeot 1 Mercedes truck 1 Toyota Cruiser
CRZ	7	1 504 Break 5 Toyota Cruiser 1 Landrover

\*DNE had 19, two of these are disabled.  
The following are also disabled: 3 for MDST; 1 for CVL.

Source: Records of the MDST, Bamako, Mali.

The average age of these vehicles is 6 years. In Mali, the average useful life of a car is 3 to 4 years. It could therefore be said that the garage manages a relatively old fleet of vehicles. This is sometimes reflected in the costs of repairs and maintenance.

For the period for which data are available, it was recognized that repairs and maintenance costs have risen over the years. These costs reached astronomical levels in 1989 and 1990. For the period October 1, 1989 to April 30, 1990, repairs and maintenance costs totaled 11,609,515 FCFA. The average cost for the period was 208,018 FCFA. Presented below is a summary of costs for repairs and maintenance for the period.

TABLE 11

Summary of Vehicle Repairs and Maintenance Costs  
Livestock Project, Mali  
October 1, 1989 - April 30, 1990

<u>Division and</u> <u>Car ID. No.</u>	<u>Repairs and Maintenance</u> <u>Cost in FCFA</u>	<u>Average</u> <u>Cost</u>
<u>1. MDST</u>		
ID # 0.1	409,448	
0.2	388,440	
0.4	109,971	
0.5	249,168	
0.6	286,608	
0.7	144,444	236,377
0.8	114,000	(Oct 89 - April 90)
0.10	81,419	
0.11	5,374	
0.12	790,820	
0.13	20,459	
<b>Sub-total</b>	<b>2,600,151</b>	
<u>2. CVL</u>		
ID # 3.1	227,259	
3.2	110,269	
3.3	310,913	
3.4	726,583	204,500
3.5	7,852	(Oct 89 - Sept 90)
3.6	27,031	
2RMF	21,597	
<b>Sub-total</b>	<b>1,431,504</b>	

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Table 11  
Repairs costs continued

<u>Division and</u> <u>Car ID. No.</u>	<u>Repairs and Maintenance</u> <u>Cost in FCFA</u>	<u>Average</u> <u>Cost</u>
<b>3. CRZ</b>		
ID # 4.1	518,744	
4.2	396,578	
4.3	302,369	
4.4	184,854	268,908
4.5	284,822	(Oct 89 - Sept 90)
4.6	121,536	
4.7	73,386	
<b>Sub-total</b>	<b>1,882,359</b>	
<b>4. DNE</b>		
ID # 1.1	126,848	
1.2	485,179	
1.3	335,401	
1.4	699,913	
1.6	513,489	
1.7	333,881	
1.8	407,841	
1.9	474,836	
1.10	234,920	335,029 FCFA
1.11	224,844	(Oct 89 - Sept 90)
1.12	266,910	
1.13	279,853	
1.14	511,338	
1.15	157,308	
1.17	442,563	
1.18	135,179	
1.19	65,198	
<b>Sub-total</b>	<b>5,695,501</b>	
<b><u>TOTAL</u></b>	<b><u>11,609,515</u></b>	<b>FCFA</b>

Source: Tableau des Depenses Effectuées sur les  
Véhicules du Projet, Période Oct 89 - Avril 90,  
MDST Files, Bamako, Mali.

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A lack of extensive data however, precludes a more systematic comparison of costs, over a long period of time. On the other hand, a brief review could be made using data on the DNE only. Presented below is a table showing annual costs for the period, 1984 to 1990.

TABLE 12

Annual Repairs and Maintenance Cost for the DNE  
From 1984 - 1990

<u>YEAR</u>	<u>EXPENSES</u> <u>IN FCFA</u>	<u>RATE OF INCREASE</u> <u>(1985 = 100)</u>
1984	*332,290	.67
1985	494,745	1.00
1986	595,464	1.20
1987	1,226,850	2.47
1988	N/A	-
1989	17,166,533	34.69
1990	** 4,395,082	-

\* 1985 was used as a base year because repairs and maintenance costs for 1984 covered only 2 months (November and December).

\*\* Represent costs for the first 7 months of 1990.

Source: DNE volet accountant, Bamako, Mali

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On the basis of the information provided above, costs in 1984 were 67% of those incurred in 1985. In 1986, these costs had increased by 20% over those of 1985. In 1987, they were 2.5 times more than the costs incurred in 1985. By 1989, the same costs had multiplied approximately 35 times, using 1985 as the base year.

A review of gas consumption records for all vehicles has also established that gasoline costs have gone up systematically over the period.

The above comparison pre-supposes the following:

- (a) the current fleet of vehicles is old and costly to maintain;
- (b) this could have serious budgetary implications especially on operation cost;
- (c) something urgent must be done to avert extreme expense account for repairs and maintenance.

Besides the problem posed by the age of the vehicles, other difficulties are currently inhibiting the smooth functioning of the garage.

First, there is an extreme shortage of spare parts. Although, orders for parts are made in bulk, current procedures and conditions do not facilitate easy procurement. One of these problems is at the level of AID--its procedures for procurement are cumbersome and long. The other problem is at the level of the local supplier who takes forever to order and deliver the needed spare parts.

Second, there is a problem with two of the mechanics regarding contractual arrangements. Third, sudden changes in government policies regarding the project's tax-exempt status has increased gasoline cost and rendered more difficult efforts to contain operation costs.

Fourth, the garage is confronted with the problem of having to repair personal cars of project staff without receiving any payment for services rendered. Although, parts are supplied by the staff for such repair works, valuable employee time is spent working on those cars.

Fifth, there is a standing agreement exists between PARC and the MDST for the latter to repair the former's vehicles at no cost (to PARC). For the period for which data are available (for 1989 only), 29 vehicles of PARC were repaired and maintained by the garage.

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## Recommendation

Against the background provided above, it is recommended that:

1. Immediate action be taken to minimize the cost of repairs and maintenance, since these costs represent important proportions of recurrent costs.
2. For the future, provisions must be made for depreciation of project vehicles to facilitate their disposal and replacement after the average useful life, which in Mali is between 3 to 4 years.
3. The problem posed by the government new directives regarding the tax-exempt status of the project should be resolved, so that the project would not have to continue paying 300 FCFA a litre for gasoline, instead of 220 FCFA.
4. All authorizations for repairs of personal cars by the Director of Administrative Affairs must be co-signed by the Director of Operations. Also, hourly labor cost incurred by the garage must be reimbursed to the MDST by the owners of the cars repaired.
5. The contractual and personnel problems regarding two of the employees in the garage should be resolved, in a timely fashion.
6. The current agreement between the MDST and PARC should be revised to the advantage of the project so that labor cost could be reimbursed by PARC to MDST.

## 4. Procurement and Inventory

MDST has developed and maintained over the years, an effective method for procuring and controlling inventory. Review of records have shown that proper procedures were followed in most of the cases and that adequate documentation supports all transactions.

However, current job descriptions and role assignments for employees working in the procurement division remain unclear and fluid. It was also discovered that the DBase III program for data management in the division was defective. As a result, there has been a backlog of data to be treated and analyzed.

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Recommendation

It is therefore recommended that:

1. Roles in the procurement and storage unit be properly defined;
2. The DBase III program be re-installed to enable the procurement staff to record transactions as and when required.

5. Accounting Manuals and Internal Control

New financial management manuals were developed and operationalized since August 1989. These manuals were derived from AID accounting procedures and based on computer programs for accounting data management and reporting. Good computer skills and knowledge of accounting principles are therefore essential for the effective use of these manuals.

During discussions with project directors and staff, it was observed that the accounting manuals did not meet all the immediate accounting and financial needs of the staff.

This inadequacy is more pronounced at the levels of the volets and the DNE. First, the staff in the volets do not have adequate equipment to use manuals effectively. Second, this problem is compounded by a lack of adequate background in accounting and a deficiency in analytical skills.

Recommendation

To resolve these problems, the evaluator recommend that:

1. All accounting staff in the volets be given the opportunity to acquire accounting and financial management skills;
2. All staff be properly equiped and provided with computers to enable them to use modern information management methods for data management, analysis and reporting;
3. The current financial management manuals should be revised (it appears that steps are currently underway to do this) to include more details and information on procedures.

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## 6. DAF and the Livestock Project

Organizationally, DAF plays an important role in the running of the project including the approval and authorization of checks. It was recognized however that, this inter-departmental coordination takes time especially, in regards to the approval of checks for replenishing petty cash accounts.

### Recommendation

To resolve this problem, it might be desirable to modify the procedure for check approval and to separate this activity from other administrative duties, to enable custodians to receive authorized checks on schedule and to replenish the petty cash promptly.

### CONCLUSION

On the whole, MDST and the project managers have done a good financial management job. This can be said for a number of reasons. First, the MDST was able to set in place proper procedures for establishing annual and quarterly budgets including monitoring adherence to these budgets.

Second, procedures were established for controlling receipts and disbursements including the control of commodities bought by the project. Third, internal control was ensured as a result of the system installed.

These comments about MDST's accounting system are relevant because the evaluator discovered through the review of records and figures that there was transparency in reporting. Infact, the ability to retrace initial investment and actual expenditures over the years was largely attributable to MDST's transparent accounting system and form of reporting.

It has also been established from review of records that the financial information generated by the system is fairly accurate and reliable. Importantly, these financial reports have been used on a number of occasions to make important managerial decisions regarding the project.

It can therefore be concluded that the system is fairly adequate and capable of supporting the financial information need of the project especially, at the level of the MDST.

During the life of the project, MEE project-related units have benefitted from MDST's support and leadership. It is believed that these units would continue to benefit from such support until they become self-sufficient and independent in accounting data management, analysis and reporting.

It is also hoped that the MDST would continue to play an important role in the formative years of the volets, as recommended by this report. After this period, the MEE can then assume full responsibility for the financial management of all its programs.

## PERSONS MET AND/OR INTERVIEWED

Tracy Atwood, AID Agricultural Officer  
Sinse Bagayoko, Director of Financial Services, MDST  
Anne Diallo, Office of the Controller, USAID/Bamako  
Fanta Diallo, Assistant Accountant, MDST  
Ibrahim Diallo, MEE  
Sadio Diallo, Cashier, MDST  
Birama Diakiate, Director of INRZFH  
Brehima Diop, Office of the Controller, USAID/Bamako  
Erebweren Djibo, Chief Accountant, MDST  
Cheick Oumar Fané, Accountant, Livestock Project, CVL  
Michell Jacob, Director of Operations, MDST  
Baguida Kéita, MDST  
Boubacar Koite, Director of Administrative Services, MDST  
Modibo Koné, Accountant, Livestock Project, DNE  
Robert Kone, Director, Administrative and Financial Services,  
INRZFH  
Diarra Koaworo, Logistics, MDST  
Poumouké Kouyaté, Accountant, Livestock Project, INRZFH  
Wayne McDonald, AID Agricultural Officer  
Souleymane N'diaye, Director, Administrative Services, CVL  
Madani Ouattara, Garage, MDST  
Ousmane Sanogo, Cashier, Livestock Project, CVL  
Boubacar Seck, Director of the CVL  
S. Sidibe, Director, DNE

Sambala Sissoko, Accounting Department, CVL

Madame Tabo, Director of DAF for MEE

Alhousseini Touré, Logistics, MDST

Mamadou Tidiane Traore, BNDA, Bamako

Dr. Togola, Livestock Project, INRZFH

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## ANNEX 1

## Summary of Scope of Work

The contractor (I) will do the following:

1. a comparison of the progress so far made between the assessments and recommendations of the previous external evaluation, the last internal evaluation and the current evaluation.
2. an assessment of project implementation performance in the area of financial management and examine the progress within the four project supported areas (MDST, DNE, CVL, and INRZEH) within the context of the guidelines set aside for the project. More specifically, the contractor will assess:
  - a. factors affecting the coordination and integration of project resources across service divisions,
  - b. the extent of institutionalization of management and financial practices,
  - c. the extent to which appropriate management and financial systems for project monitoring and implementation have been adopted.
3. an assessment of the evaluation of linkages at input to output to determine whether inputs are sufficient to achieve outputs and whether outputs are adequate to achieve the required purpose,
4. an assessment of the project's sustainability by:
  - a. examining how and what local institutional capabilities (financial) are being developed to continue the project benefits,
  - b. examining what policy conditions are required to facilitate continued long-term impact including the role of the JMC and its influence on performance,
  - c. examining the future of the MDST.
5. recommendations needed to improve performance and achieve project's goals and objectives.

At the end of the evaluation, the evaluator will furnish a draft report before his departure from Bamako. A final copy should be submitted four weeks after his departure from Bamako.

## ANNEX 2

## QUESTIONNAIRE

S'il vous plait, donnez nous vos reactions sur les points suivants. Notez la répartition des notes:

- 1 = Médiocre ou nul en général, extrêmement faible, négligeable
- 2 = Passable; niveau à peine satisfaisant; faible
- 3 = Niveau assez bien; bien que bon
- 4 = Tres bien suffisant et adequat

A. Environnement

1. Intégration du systeme financier de la ESDG dans la politique des volets

1                    2                    3                    4

Si votre réponse indique une faiblesse, veuillez nous donner des explications

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2. Quelles sont les relations de travail entre la ESDG et les autres volets et ministères?

1                    2                    3                    4

Veuillez nous donner des explications si votre reponse indique une faiblesse

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3. Quel est le niveau de compréhension de la mission et buts de l'ESDG par les autres partenaires/ministères?

1                    2                    3                    4

B. INDIVIDU DANS L'ORGANISATION

Selon vous, quelle est la compétence individuelle de vos subordonnés dans les domaines suivants:

En Synthèse (en finance)

-	définition de problème(s)	1	2	3	4
-	fixation d'objectifs	1	2	3	4
-	recherche d'alternatives	1	2	3	4
-	innovation/adaptation (capacité d')	1	2	3	4

C. EXECUTION ET COORDINATION (en finance)

-	établissement de calendriers d'exécution (programmation)	1	2	3	4
-	capacité technique spécifiquement adaptée au travail requis	1	2	3	4
-	respect des délais (gestion du temps)	1	2	3	4
-	compte rendu (écrit et oral)	1	2	3	4
-	Connaissances des règles et procédures	1	2	3	4
-	Exercice de responsabilité	1	2	3	4
-	Saisie et circulation de l'information financière	1	2	3	4

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D. TECHNIQUES SPECIFIQUES

- a = extrêmement utile et urgent  
 b = nécessaire  
 c = nécessaire mais pas urgent, déjà moyennement maîtrise  
 d = inutile car très bien maîtrise presentement

Selon vous, est-il utile de développer des cours de perfectionnement dans certaines techniques administratives spécifiques?

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Veillez indiquer l'utilité de chacune d'entre celles citées ci-dessous:

- Procédures administratives and financières

a            b            c            d

- Analyse financière

a            b            c            d

- Techniques d'élaboration d'un budget

a            b            c            d

- Comptabilité publique

a            b            c            d

- Comptabilité d'entreprise

a            b            c            d

Autres \_\_\_\_\_

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ANNEX 3

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## ANNEX V

### Animal Production: Inputs

Period: Start of Project to September 1990

Commodities:	Vehicles and mobylettes		
	Office & miscellaneous equipment		
	Agricultural equipment	\$247,787	13.35%
Technical Assistance		\$858,000	46.23%
Construction		\$000,000	
Training		\$235,210	12.67%
Operating Costs		\$514,943	27.75%
Studies		\$000,000	
<b>Grand Total</b>		<b>\$1,855,940</b>	<b>100.00%</b>

Note: This is 9.81% of total project expenditure

The following are comments on the construction and training inputs only.

#### Construction

\$45,000 was budgeted for renovation of a building at Sotuba to be used as a feed analysis facility. After careful survey, the building was determined unsuitable for this activity. The money now is designated for construction of cattle pens for feeding trials. Work should be completed before the end of project.

#### Training

**Summary:** Since January 1989 a total of 200 people received in-country short term training in a variety of appropriate topics including diagnostic networks, computers, short wave radios and technical packages. Ten researchers received short-term training abroad in a variety of subjects. Although this was useful, in-country training focused specifically on local problems and constraints might be more effective. Four participants earned a masters degree or its equivalent, all

returned to Mali and are working on project related research. In order to ensure that future long term training abroad be useful, it is suggested that greater collaboration be established between Malian institutions and Title XII universities and that research for these be undertaken in-country.

### In Country

Since January 1989, six training courses were planned and implemented covering the following topics: Diagnostic Network (3 sessions 66 people), Computer Skills (4 sessions 21 people), Short Wave Radio Skills (3 sessions 12 people), Diagnostic Network (1 session 17 people), Seven Technical Packages (4 sessions 58 DNE & 43 OHV people), Computer Skills (1 session 6 people) This is a total of 200 people receiving in-country training which improved their skills and increased efficiency of the extension and research components.

### Short Term

Ten researchers received short term training outside Mali in a variety of subjects. It was suggested that more in country training focused specifically on local problems and constraints would be more productive.

### Long Term

Four participants earned their Masters or equivalent, all returned to Mali and are working in project related research. Two were trained in France in Animal Nutrition while the other two studied Range Management and Animal Husbandry in the USA.

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## ANNEX VI

### Studies and Reports

**Joint Program INRZFH\CIPEA \***  
**Mali Livestock Sector II \*\***

**Trends of Livestock Offered and Prices during the Dry Season (January to June 1985) at Four Markets in the Embouche Paysanne Zone (5/1986) \***

**Production and Management of Agricultural Products (2/1988) \***  
**Importance and Characteristics of Dairy Products in the Semi-arid Zone (2/1988) \***

**Sanitary Aspects for Fattening Cattle in the Semi-arid Zone (3/1988) \***  
**Investigations into the Sanitary Conditions of Animal Production in the Semi-arid Zone 1987/88 (3/1988) \***

**Evaluation of the Effects of Different Feeds on Zebu Cattle in the Semi-arid Zone of Mali 1986/87 (3/1988) \***

**Preliminary Results Comparing the Effects of Different Treatments for Worms on Production in Small Ruminants in the Semi-arid Zone of Mali (3/1988) \***

**Fattening Sheep in the Semi-arid Zone 1986/87 (3/1988) \***

**Analysis of Three Milk Production Systems around Bamako (8/1988) \***

**Livestock Production in Central Mali, Studies on Meat and Milk Production from Cattle and Small Ruminants, Animal Traction, and Forage Production (8/1988) \***

**Preliminary Results of Research on Work Animals in the Semi-arid Zone of Mali (9/1989) \***

**Technical and Socio-economic Aspects of Including Basic Forages in the Farming System (5/1989) \*\***

**Follow Up of Fattening Sheep in the Semi-arid Zone 1987/88 (5/1989) \*\***

**Comparison of the Effects of Forage Production and Other Inputs in the Farming System 1988/89 (5/1989) \*\***

**Comparison of the Effects of Forage Production and Other Inputs in the Farming System 1989/90 (3/1990) \*\***

*Acquisition et Consommation du Lait et des Produits Laitiers a Bamako (3/1990) \**

Use of Urea Enriched Crop Residues as a Supplementary Feed for Small Ruminants (3/1990) \*\*

*Distribution Mensuelle des Vélages et Intervalle entre Vélage Chez les Bovins de Race Locale autour de Bamako (preliminary results) (3/1990) \**

Study of Small Ruminant Meat Production in the Semi-arid Zone of Banamba (3/1990) \*\*

Farm and Tree Production of Forage in the Sub-humid Zone of Mali (1989) \*

Qualification of Natural Resources (complete)

*Commercialisation du Lait dans le District de Bamako (4/1990-9/1991) \**

Cost of Production of Milk in the District of Bamako (3/1991) \*

The Effect of Supplementary Feeding of Pregnant and Post Partum Dairy Cows and Young Calves in Three Management Systems in the District of Bamako (1991 or 1992)\*

Livestock Marketing

(Not yet started)

Animal census

Herd composition

Simple Milk Production Hand Book

Livestock Marketing Study

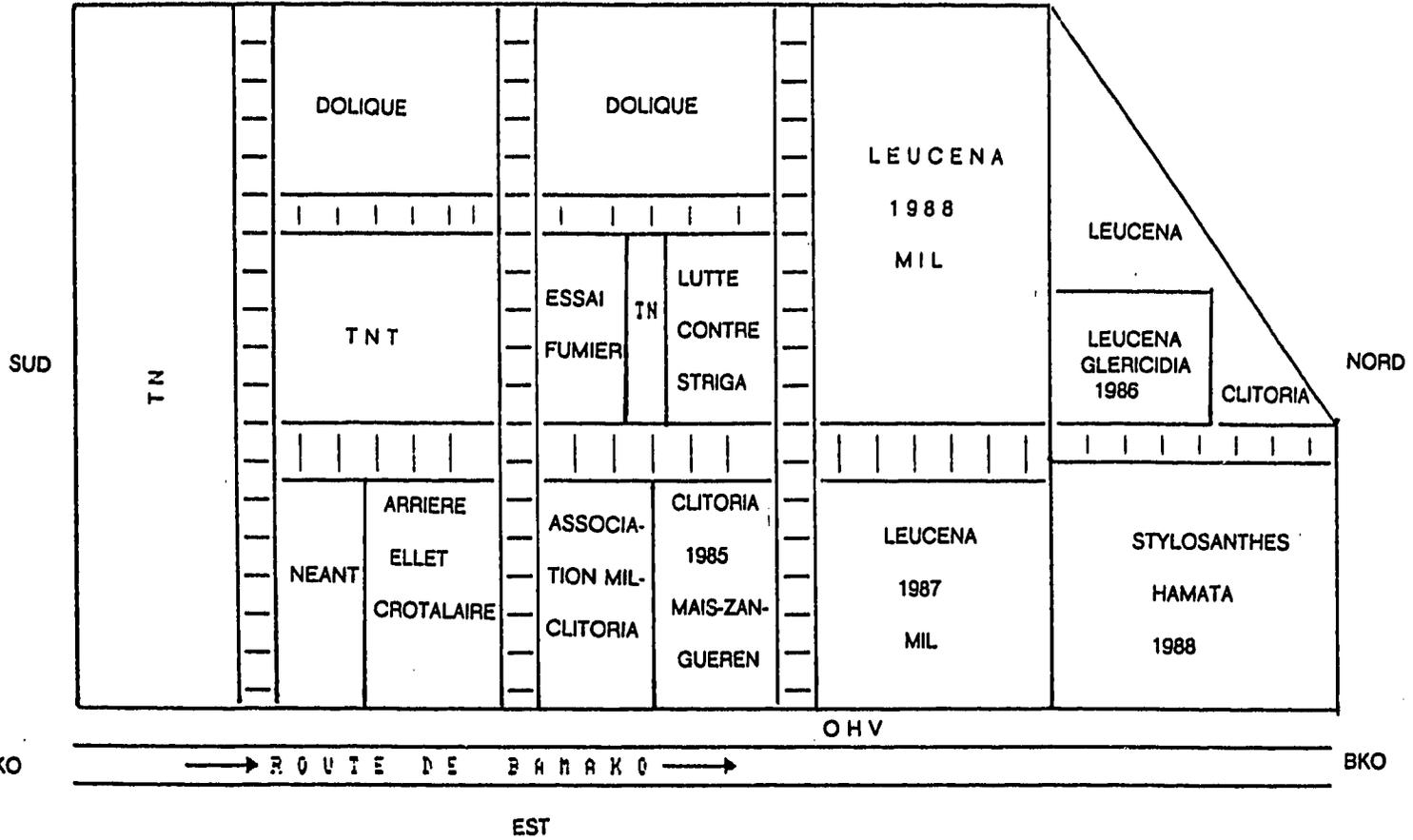
# ANNEX VII

## Integrated Livestock/Farming System Model

PLAN AGRONOMIQUE DE LA STATION D'ESSAI AGRONOMIQUE

Bba  
1990-1991  
Project Sectorial  
de l'Elevage - Volet Recherche  
CRZ - SOTUBA

QUEST



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## ANNEX VIII

### Tenure of Key Project Personnel

Year	1982	1983	1984	1985	1986	1987	1988	1989
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#### USAID

Director	Wilson		Chiavaroli				Brennan	
ADO	R. Ehrich		J. Jackson				T. Atwood	
Project Manager	McCarthy		R. Niec				Phelps W. McDonald	

#### Contractors

USDA COP	Chloux		Cook				Jacob	
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Chemonics Finance			Pronovost					
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MIS						Kraidy Poulon Desjardin		
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## ANNEX IX

### Animal Production

#### Progress Towards Achieving Objectives: Technical Details

**Objective A** Develop through continuing research appropriate technical packages to provide year-round, nutritive forage for livestock in the semi-arid and sub-humid project zones, which can be incorporated into traditional cropping systems and respond to producers needs.

#### Semi-Arid

Five new forage species to be identified. Two new forage production packages to be extended.

Seven new varieties of legumes were identified. Two new varieties of legumes were extended Four new varieties were pre-extended.

- 1) **Lablab purpureus (dolichos):** drought tolerant, high yielding, stays green well into dry season when it can be harvested with less danger of spoilage and when labor demands have diminished. Widely accepted by farmers. 2079 kilograms of seed distributed in 1990 growing season which should plant 200 hectares. Constraint to broader dissemination is restricted seed supply. Extended.
- 2) **Stylosanthes hamata:** drought resistant, shows promise in test plots and is being field tested. Pre-extended.
- 3) **Clitoria ternatea:** extremely drought resistant perennial that withstands severe grazing and produces viable seed, good yielding, useful during the fallow rotation. Pre-extended.
- 4) **Crotalaria juacea:** produces up to 4 tons/ha green manure, system developed enabling farmers to plow under in November when labor more available. Fields ready for planting after first rain. Chemical fertilizer substitute. Pre-extended.
- 5) **Leuceana leucephala** and
- 6) **Gliricidia sepium:** good producers of high quality forage but difficult to establish for alley cropping because the goats love the seedlings. Leuceana pre-extended.

- 7) Niebe TN8863: early maturing, valuable as an early farm family food supply during period of soudure. Dual purpose, producing large quantities excellent hay. Extended.

End of Project Bench Marks (EOPBMs): 100 producers adopt the forage production technical packages. INRZFH reports 50 producers are trying the technical packages. This figure may be low because reports during field visits indicate a much broader acceptance of dolichos.

### Sub-humid

Five new forage species to be identified. Two new forage production technical packages to be extended.

Five new varieties of forage were identified. Two new technical packages were pre-extended.

- 1) Dolichos: Pre-extended;
- 2) Stylosanthes hamata: Pre-extended;
- 3) Leuceana leucephala;
- 4) Gliricidia sequim;
- 5) Sesbania sesban (research started 1989)

EOPBMs: 50 producers adopt forage production packages. INRZFH reports 25 producers are field testing 1 & 2. This figure may be conservative due to the observed wide use of dolichos.

**Objective B** Improve animal nutrition, increase forage production, and sustain production of the natural resource base in the project zone through a better allocation and rational use of land resources.

### Semi-arid

Small ruminants: 5 improved rations to be identified  
3 nutritional packages to be extended  
7 improved rations were identified  
3 technical packages were pre-extended

Bush roughage free choice plus:

- 1) 6.6 gm/day FN/kg of live weight
- 2) 6.6 gm FN + 3.3 gm ABH/day/kg live weight
- 3) 6.6 gm FN + 6.6 gm ABH/day/kg live weight

- 4) 13.2 gm/day FN/kg live weight
- 5) 13.2 gm FN + 3.3 gm ABH/day/kg live weight
- 6) 13.2 gm FN + 6.6 gm ABH/day/kg live weight
- 7) Bush roughage treated w/4% urea free choice

Nos. 6 & 7 plus a health and vaccination technical package were pre-extended

EOPBMs: 50 producers adapt the technical packages. INRZFH reports 36 producers are trying the packages

Draft cattle: 3 improved rations identified  
 2 nutritional packages to be extended  
 5 improved rations were identified  
 2 technical packages extended

Bush roughage free choice plus:

- 1) 2 kg/day FN Pre-extended
- 2) 2 kg FN + 1 kg ABH/day
- 3) 2 kg FN + 2 kg ABH/day
- 4) Bush roughage treated w/4% urea + 1 kg/day ABH Pre-extended
- 5) Bush roughage treated w/4% urea Extended

EOPBMs: 100 producers adopt improved nutritional packages INRZFH reports 70 producers are trying the packages

Natural

Resources: 100 DNE agents trained to implement appropriate natural resources management techniques

50 producers in project zone adopt improved natural resource management practices

95 agents from DNE and OHV were trained to implement natural resource management techniques by June 1990

Technical packages introduced under Objective A demonstrate the value of legumes used in crop rotations to build soil fertility, reduce erosion and control weeds. To a lesser extent, tree legumes are being used as wind breaks, to conserve soil and moisture and provide forage.

**Objective C** Facilitate the integration of agriculture and livestock by improving applied animal production research and strengthening the animal production extension

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service to more effectively disseminate appropriate technical packages to producers.

The livestock extension service is almost entirely staffed with people who were trained in animal health and disease control. For years this has been the only function of the service. These constraints are being controlled in an efficient manner. Now DNE has re-directed focus on animal production and management. DNE and INRZFH are conducting seminars which instruct agents in the use of technical packages; however, the entire service needs training in animal production, management and extension methods.

Despite their lack of training, extension agents have introduced and are extending four new livestock rations, three improved legumes, and the concept of adding 4% urea to crop residue and roughage to increase nutrition and adding molasses to improve palatability. They are showing how these two products can be stored in banco silos and how to build the silos. They are encouraging the use of hangars to store hay in improved livestock pens which provide shade and which concentrates accumulation of manure under the shade. This increases available manure which is spread on the fields and in some cases it is composted first. Either way soil structure and fertility are improved. The following example shows a typical Integrated Livestock/Farming System Cycle which combines the components being promoted by extension.

Sorghum is grown by a farmer to feed the family and provide some cash. Crop residue & bush hay are improved by adding 4% urea to increase nutritional value & molasses is added for better palatability. It is stored in 1 meter square banco silos.

Crop residue is fed with improved feed rations (using industrial by-products), and improved legume forage that is stored on a hangar which provides shade in the pen for livestock.(may be draught, milk or feeder cattle, small ruminants or a combination of all) The hangar concentrates manure accumulation under the shade. Manure may be applied to the field as it comes from the pen or composted first and then applied to the field. Sorghum or an alternate crop is planted and the sustainable cycle starts all over again.

It was estimated that the manure collected from penning livestock in Regions I & II in 1989 had the cash and fertility equivalent of 503 sacks of urea, and 435 sacks of superphosphate. Also in 1989, with their own resources farmers constructed 512 hangars, 235 pens and 192 compost pits.

**Objective D** Identify production constraints, and the structure, composition, movement, and marketing of livestock within the project zone.

The two major production constraints are insufficient rainfall and infertile soils. Research capabilities in this project are not equipped to cope with the first. Research on growing legumes and green manure, applying pen manure and chemical fertilizer in

economical amounts will help to correct poor soil fertility. The labor shortage in certain zones is being addressed by discovering techniques to save and spread it over a longer growing season by introducing shorter and longer maturing varieties. Many farmers work with old, worn out equipment because farm credit is not available for them to purchase replacements. A reliable, adequate seed supply is needed to allow wider distribution of new varieties by extension agents to increase planting by farmers.

Technicians from INRZFCH, ILCA and OMBEVI have studied marketing. DNE has trained and is continuing to train additional agents so they can follow designated herds and collect data relative to herd structure, composition, and movement. Delayed funding postponed starting this study on time. Recently funds were received, it has started and agents are beginning the work within the project zone.

## ANNEX X

### Progress Made on Mid Term Recommendations for Research and Extension

The final evaluation team agrees with findings of the mid-term evaluation. Although rather optimistic, they are very much on target. Progress in research and extension has accelerated since the mid term evaluation was performed. This should continue throughout the life of the Project. This is normal, considering the time required to initiate and nurture research until it has begun to produce reliable data. The Project has entered its payoff period.

According to the midterm evaluation, "the research component has generally gone well. USAID provided leadership and timely support, and both INRZFH and ILCA have been effective partners. The Research Unit was well chosen. Over the last two-and-one-half years, it has completed an impressive number of usually well-written studies, and it is continuing to progress at a healthy pace. The expatriate technical staff have proved themselves worthy of ILCA's reputation of high technical competence.

"Some issues, however, remain unresolved. The recommendations that follow are generally based on these issues and are directed at the level of USAID, MRNE, INRZFH, ILCA, and the Research Unit."

Recommendations made by the mid term evaluators are listed below. Each one is followed by a comment as to its current status.

*1) Rainfall in the Banamba area has dropped from an annual average of 745 mm to 558 mm per year and now is considered to fall in the semi-arid zone. It is recommended that the Research Unit be shifted or expanded to the sub-humid zone.*

Research continues in Banamba, which was reclassified as semi-arid. Sotuba has been designated as the sub-humid station but limited research is being conducted there. Techniques developed at Banamba are undergoing field testing in the 100 km band around Bamako and elsewhere in the sub-humid zone. Under the new IER strategy, the country will be divided into 6 research zones designated by environmental considerations rather than political boundaries.

*2) As a corollary to recommendation 1, research should be seen as an independent pursuit which exists in its own right and not as an adjunct to the Embouche Paysanne. Research is conceived in the Project Grant Agreement as serving all animals, cattle or small ruminants, and not only the cattle fed each year under that program. This fact should be clarified at a high level once and for all.*

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Research is beginning to include more aspects of animal production, including cattle and small ruminants to be fed for slaughter, work oxen, dairy cows and calves and small ruminants kept for household use. More research should be done on small ruminants as well as poultry management for meat and eggs.

*3) The Research Unit should continue its focus on legume-based forage production research. Supplementing the nutrition of livestock with legume forages should be considered as a critical step in improving the productivity of smallholders.*

This has been the main focus of the research program and is on-going in both sub-humid and semi-arid zones.

*4) In addition to continued work on introduced cultivars, the Research Unit should put an emphasis on identification of native West African legume species that are tolerant to local plant diseases and to low-phosphorus soils. ILCA, in cooperation with the International Board for Plant Genetic Resources and other international research organizations has already conducted preliminary testing of indigenous forages in Mali, finding that applications of phosphorus at 50 Kg/ha can increase yields of dry forages up to 300 percent.*

Little has been done to identify and work with local West African legumes. This should be carried out on a priority basis during the final year of the Project and in any follow-on activity.

*5) Generally, intercropping of legumes with a grain crop reduces yields. However, a grain crop in rotation with a forage legume increases grain yields. The Research Unit should propose and introduce possible crop rotations in the study area.*

Trials to determine the residual effect on yields of food crops following pure stands of forage legumes are underway at Banamba. This type of research takes a minimum of two growing seasons before preliminary results are available.

*6) Since imported phosphorus fertilizers are very expensive and as Mali has its own commercial-size Tilemsi rock phosphate (TRP) deposits which have provided good crop response on Malian acidic soils, the Research Unit should include TRP in their trials.*

The effects of applying 300 Kg, 150 Kg per hectare and no TRP are being studied at Banamba.

*7) So far the Research Unit has conducted no basic resource studies such as soils, hydrology, and land use. This line of research should start as soon as possible, to the extent that the research coordinating council decides that it has not been adequately covered by other organizations.*

Soil testing for nitrogen, phosphorus and organic material is done before and after all legume trials. No basic resource study has been done.

*8) The Research Unit should identify prevalent local weed species and devise cultural and other practices to eradicate them in cropped areas.*

Strigga Sp. is the most harmful weed for farmers, economically. Being a parasite, its roots penetrate those of sorghum and millet and reduce yields. Trials are being conducted to eliminate this pest with pure stands of Dolichos, clitoria, and stylosanthes.

*9) The Research Unit should continue with studies of household economy -- covering such topics as farm budgets, unit costs of production, marketing practices, subsistence needs, and sales and purchases by smallholders.*

This is an on-going activity.

*10) The Research Unit should carefully take into account the in-depth studies on small ruminants that have been conducted by OMBEVI in cooperation with Tufts University. Any part of on-going small ruminant research that duplicates the previous studies. Generally, the Research Unit staff should be careful to make use of available studies and reports as base documents before undertaking any new work, in this and other areas.*

Techniques of feeding, health, and management of small ruminants continue to be developed along with studies of the economic effect of this activity on the household economy. More should be done.

*11) In the past the Research Unit has not coordinated with other research organizations such as IER, SAFGRAD, ICRISAT (which have already coordinated with one another), and other projects run by USAID. It should network with other research organizations within and outside Mali and actively collaborate with both scientists and better farmers.*

This network has not been satisfactorily established. Good collaboration has been developed at the field/farm level.

*12) INRZFH had agreed to provide a sociologist/anthropologist to the Research Unit, but the position has not yet been filled. A full-time sociologist is needed to ensure that actual forage interventions are in accord with researcher expectations and local perceptions.*

There is only one sociologist/anthropologist on INRZFH staff who works with CNRZ on a time available basis. There is also a sociologist on the ILCA staff who also devotes time to Project research activities.

*13) INRZFH should also name two researchers to the Research Unit to replace those recently nominated for two years study in France.*

This was done.

## ANNEX XI

### Progress Made on Mid Term Recommendations for Future Project Support

The recommendations for future project support made by the mid term evaluation remain appropriate and are listed below followed by final evaluation team comments.

*1) USAID should continue its technical assistance program with MRNE in the area of research at least at the present level throughout the life of a follow-on livestock sector project.*

This should include TA to evaluate ongoing livestock improvement work, an assessment of national needs and planning and implementation of a livestock improvement program.

*2) The present multi-disciplinary and multi-commodity farming systems research approach should continue. It should be aimed at the integration of crop and livestock production of smallholders in the sub-humid zones of Mali. However, it should recognize and directly address the problem of the added labor burden -- specially on women and children as emphasized in section \*B.3.d.ii. of this report -- that such development inevitably entails. Earlier FSR work on the labor problems of mixed-farming, as summarized in Delgado (1979), should be carefully examined for lessons learned.*

Work should continue in the semi-arid zone as well. The added labor burden to women and children from integration of crop and livestock production is questionable.

*3) Focus of research should be the integration of small ruminants in the farming systems of smallholders.*

Poultry husbandry and improvement should be of equal importance.

*4) A reorientation of research from the present semi-arid to sub-humid zone will result in a sharpened emphasis on milk production for Bamako and on animal traction, which is crucial to the sustainability of sedentary agriculture in the sub-humid zone.*

This will be addressed under the strategy of IER.

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*5) Research should continue concentrating on the development of low input legume-based forage production and use legume fodder banks (in small fenced areas) for selective feeding. It should propose new crop rotations with legume crops.*

This is being done now and work will continue.

Attention should be given to agricultural policy vis a vis traditional transhumant herding and increasing development of sedentary farming.

*6) Forage technology development and interventions should remain the basis for livestock production. We suggest that the new research take advantage of ILCA's sub-humid zones research at Kaduna in Nigeria and include tree forage legumes in the program.*

Attempts at establishing pure stands of tree forage legumes for forage production or alley cropping have not been successful because of the Mali's open range system.

*7) Soil science, and a small functional soil testing laboratory capable of performing straight-forward testing of soils, water, and plants, should be considered as part of the multi-disciplinary approach. Full use of Landsat and other land use data now available with the Inventory of Land Resources Project (PIRT) should be fully exploited.*

This recommendation should be directed to IER.

*8) The high priority now assigned to the training of Malian counterparts should be seen as crucial to the institution-building in the INRZFH. This policy should remain in full force throughout the life of a follow-on project.*

This is more appropriately directed to IER.

## **ANNEX XII**

### **Suggestions for Financing Privatization in the Livestock Sector**

Under its IMF Program the GRM is being required to separate 6,000 to 8,000 public servants. In addition, numbers of young people are being graduated from the schools with no assurance of a government job as was previously guaranteed. To exacerbate the situation, there is no large business, commercial, manufacturing or industrial sector to which they can turn. Some can return to family farms but that is not a universal solution. An efficient use of this talent pool may be the institution of efforts to enable some of the unemployed as well as private veterinarians to enter the private sector as entrepreneurs in agro-business. To do so would require a source of financing to provide credit, loans and venture capital for micro, mini and large scale agriculturally oriented enterprises.

The GRM could play a significant role toward stimulating venture capital investments by making a commitment, at the concept stage of a business plan, to provide land as part of the capital investment. In addition to his participation as manager, technical advisor or similar position, the entrepreneur would be expected to provide equipment, funding or other equity. A value would be placed on his contributions in kind. The value of the land, plus the total equity of the entrepreneur could then be matched by a Malian venture capitalist or outside investor. The entrepreneur would negotiate a realistic grace period with the GRM during which a cash flow would be built up, before it would be required to pay the GRM for the land. This could be done in monthly installments over an extended period. The new entrepreneur could also negotiate with the venture capitalist, a reasonable timetable for repurchase of the investor's shares in his business as well as the profit margin on the venture capitalist's investment.

While preparing the business plan, careful analysis must be done to determine major inputs such as technical assistance, packaging and marketing expertise, initial land preparation, planting material, breeding stock, fertilizer, insecticides and labor. The cost of these plus all other inputs must be budgeted for a five to ten year period, depending on the type of enterprise and time frame required to develop a positive cash flow.

AID could participate by establishing an agricultural venture trust fund which could be administered by PVOs. They could operate individually or a group might wish to collaborate, each providing one member to the board of directors for a new institution which would function uniquely as the administrative organ for the agricultural venture trust. This activity could be modeled after AID's Latin America/Caribbean Bureau's High Impact Agricultural Marketing and Production (HIAMP) Project. It should avoid the major constraint to HIAMP success by placing expatriates in the decision making positions for the first five to ten years. The HIAMP Agricultural Venture Trust (AVT) is made up of local, successful, conservative businessmen. They know they will still be in country if the project

fails or any significant investments turn out to be losers. They will have to live with and account for their bad investments long after AID is gone. For this reason the AVT is reluctant to take the risks needed to stimulate agricultural growth. If expatriates had been the decision makers in the early stages, the failures during this learning period would have been attributed to the expatriates rather than local business people. Locals could have taken over later in the project when successes would be far more numerous and a more conservative approach could be adopted.

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## ANNEX XIII

### Opportunities for Privatization in the Mali Livestock Sector

#### *Seed Multiplication Farm*

A major constraint to successful extension and adoption of cultivars identified by research is the lack of seed because there is no seed multiplication capability in Mali. The research unit at Sotuba is devotes some of its scarce resources to this effort and have planted one field for the production of legume seed. When innovative farmers are given seed by Sector Chiefs, they are required to return the amount they received plus an additional portion of their first harvest at harvest time. Although this is a sustainable activity, it is a very slow way to promote acceptance of this type of technical package. When farmers save their own seed year after year, there is risk of degeneration of productive as well as loss if beneficial characteristics. Extended dry periods could reduce or almost eliminate the seed supply.

#### *Soils and Water Laboratory*

IER maintains a soils lab at Sotuba but it is engaged in government research activities. Increased intensive farming activity by the private sector, particularly if irrigation is required, will create a market for this service. It might be self sustaining if leased with an option to buy to a business person or even to the current laboratory staff.

#### *Tienfalls Feed Lot*

This is an expensive bit of infra-structure that has been idle for too long. When under construction it was recognized that the government would never manage it profitably. Recommendations were made at that time to lease it or negotiate a private sector management contract. In addition to the feed lot, part of the quarantine facility remains intact as well as several hundred acres cleared for forage production. If these fields were included in a lease, the feed lot operator could produce his own forage or divide the fields into smaller parcels and have local farmers produce for him on a contract or share crop basis.

#### *Tilemsi Natural Phosphate*

There are mixed opinions as to the value of this product. However, most people think that it increases production over the long term on most crops. The private sector should be given a chance to develop this resource. To be successful, they must be given control from at the mining stage through all production activities including promotion, transportation, warehousing, pricing and distribution.

### *Chick Hatchery*

Large poultry producers import their chicks from France and small country producers hatch their own eggs under broody hens to produce their own chicks. Both methods are expensive and inefficient. One of the more successful poultry producers in the urban areas should be encouraged to import an incubator along with the technique of producing high quality chicks. It is possible that a French or U.S. hatchery would provide a franchise. The Segou Catholic Mission, through its *Projet Perfectionment Des Artisanat Rural* will teach farmers to construct 50 egg capacity incubators from wooden packing cases and kerosene lamps. MDST should provide Dr. Kounta with travel expenses and a few days per diem to go to Segou, get the plans and learn the technique.

### *Feed Milling and Parastatals*

This activity is currently under control of the large parastatals that process cotton, produce vegetable oils and process cereal grains. The feed milling activity and some of the parastatals should be privatized.

### *Slaughter Houses, Meat and Hide Processing*

All three of these agro-industries would be more productive and profitable in private hands. To avoid the possibility of a monopoly formation, no one entrepreneur should be allowed to control all three.

### *Distribution of Livestock Inputs*

A number of veterinary pharmacies were visited. The shortage and unreliable supply of pharmaceuticals was the most heard comment. In the U.S. there are distributors scattered through out rural areas, companies that sell retail as well as wholesale, to farmers as well as to veterinarians and smaller retailers. In addition to pharmaceuticals, they sell syringes, balling guns, nose rings and twitches, halters, harness, bridles and saddles, horse-shoes, boots, whips and scales. In short, anything the farmer or rancher needs. At least one Farm and Ranch Supply is needed in Mali now. Adequate start-up capital and good management could create a supply source beneficial to both farmers and the entrepreneur brave enough and smart enough to take a chance in Mali.

## **ANNEX XIV**

### **Suggestions for the Privatization of Pharmacies and Veterinary Services**

Legislation completely privatizing the veterinary service was signed in mid-August 1990. Prior to this, veterinarians were allowed to open veterinary pharmacies and sell pharmaceuticals at a fixed price, under supervision of the *Pharmacy Veterinaire du Mali* (PVM), with special permits issued by the MEE. They could neither import these products without special government permits nor could they diagnose and treat animals. This new legislation achieved the following:

- It eliminates the monopoly which the PVM maintained over the importation of drugs and allows their sale on the open market.
- It permits veterinarians to open animal clinics and to diagnose and treat animals.
- Prices may be set by the supplier and are controlled by market forces only.

A Veterinary Association has been formed with the mandate to:

- Approve credentials of practitioners who apply to the GRM for permits to practice.
- Determine the geographical location where permits to practice will be granted.
- Collect one percent of members' salaries to establish a fund which will be used to guarantee bank loans to veterinarians who wish to establish pharmacies and clinics.
- Work with the GRM to refine policies which define the geographic areas which have the potential for:
  - Complete privatization
  - Partial privatization, with certain services provided by the government
  - Little privatization due to large size and sparse population
- Assist in the definition of the government role in routine vaccination campaigns and study the pros and cons of government vaccination on a national basis as opposed to all or part of national vaccination campaigns performed under contract by private sector technicians.

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Veterinarians are excited and enthusiastic about their financial future as well as the potential contribution they feel they can make to the livestock sector. At the same time they are somewhat anxious about complete independence. They recognize their shortcomings and their need for help in re-defining the rules under which they must operate once they have cut the government umbilical cord.

There is little supporting infra-structure for the industry, few drug and supply houses to stock pharmacy shelves and little competition for the PVM. As yet there are no drug manufacturers, little manufacture or distribution of salt blocks, mineral supplements and feed mixes or other in-puts to the livestock production industry so familiar to American farmers and cattlemen. In the U.S., manufacturers, wholesalers, retailers, researchers, extension agents, breed associations, cooperatives and producers associations all distribute fliers, booklets, technical letters and send sales representative to farms, ranches and veterinarians' offices. Livestock producers are constantly bombarded with information from various competitors extolling the virtues of their products. They also have access to magazines, catalogs from supply houses as well as daily, weekly, and monthly market news letters and breed journals. We have county and state fairs, all types of livestock and breed expositions, demonstrations, sales and extension service field days. The list goes on and on but most of this is missing in Mali forcing producers, breeders, veterinarians and other livestock oriented people to operate in a sterile atmosphere and partial vacuum.

Technical assistance in the form of International Executive Service Corps (IESC) volunteers, representatives from private sector manufacturers, suppliers and others is needed to create a system that can meet the needs for products and to establish a distribution network. In addition, financing in the form of increased loans to the livestock and agricultural sectors as well as venture capital is needed.

If it has not already done so, the Embassy Commercial Section could take the lead to encourage other developed country embassies to alert U.S. and European business communities to opportunities for their entrance into a lucrative market in Mali. Investors should be encouraged to visit Mali. A private sector climate analysis could be conducted and a forum arranged in which foreign investors and Mali entrepreneurs could exchange ideas and aspirations.

The evaluation team visited private veterinary pharmacies. A reliable source of pharmaceuticals is their most serious problem. Another problem is that bootleggers refill used drug containers with fluids, powders or material which resembles the original product. The refilled containers are smuggled across the borders from Nigeria and Ghana and sold directly to herders at discounted prices. The GRM and the Veterinary Association should take measures to control this illicit business and teach herders how to detect fraudulent products as well as the dangers of buying at cut-rate prices from non-professionals.

## ANNEX XV

### People Contacted

Dr. Bocar Diallo	Cabinet Director, MEE
Dr. Gagni Timbo	Conseiler, MEE
Michell Jacob	Director MDST
Mr. Dao	Sector Chief, Kati
Bonfing Koite	MDST
M. Togala	Director, CNRZ
Dr. Mamdou Traore	CNRZ
Racine Ly	CNRZ
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Dr. Mamadou Samassekou	Ordre Veterinaire
Dr. Aly Diall	Regional Director Kayes
Dr. Ousmane Bah	SAPROSA
Dr. Oumar Tall	Director General, IER
Diotianga Diamontene	Assistant Director, IER
Almamy Sylla	AGROPAM
Dr. Daouda Diarra	Regional Director, Koulikoro
N'Do Kone	Assistant Chief, OHV
Dr. Adly Hassanein	Team Leader, USAID TA Team, OHV
M'Paba Sylla	President, Touba Cattlemen's Association
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Mamadou Djankouma	President, Sirakorola Cattlemen's Association
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Baberry Diarra	Assistant Director, Kayes
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Dr. AK Diallo	ILCA
Dr. Karamoko Wague	PARC
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<b>Dr. Alunozai Maiga</b>	
<b>Dr. Bouba Sy</b>	
<b>Dr. Seidou Sidibe</b>	<b>DNE - PP</b>
<b>Dr. Amadou Diallo</b>	<b>DNE</b>
<b>Dr. Doumbia Hawai</b>	<b>DNE</b>
<b>Dr. Mamadou Kane</b>	<b>DNE</b>
<b>Dr. Sow</b>	<b>Assistant Director General, DNE</b>
<b>Dr. Mamadou Camara</b>	<b>Director General, PVM</b>
<b>Dr. A. Traore</b>	<b>CNRZ</b>
<b>Dr. Yacouba Samake</b>	<b>Director, IER</b>
<b>Fousseini Sylla</b>	<b>President, Dioila Poultry Association</b>
<b>Mr. Berthe</b>	<b>Extension Agent, DNE - PP</b>
<b>Mr. Bagayogo</b>	<b>Division Chief, Animal Production - DNE</b>
<b>Mr. Bagayogo</b>	<b>Financier, MDST</b>

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