



TUFTS UNIVERSITY  
School of Veterinary Medicine

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RPT

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Dr. A. Maiga  
OMBEVI  
B.P. 1382  
Bamako  
Mali

Cher docteur Maiga

Selon notre discussion, j'ai l'honneur de vous envoyer ce rapport final avec les additions suivantes pour les trois semaines de consultation faites par Madame Mahan et moi.

La proposition pour la fin du projet a été envoyée à Washington hier. Les questionnaires pour l'enquête sur les marchés seront envoyés aussitôt que possible.

Veuillez accepter mes meilleurs sentiments distingués.

*Robert Gregory*

Robert Gregory, D.V.M.

RG/mfs

cc: Dr. A. Cissé  
Mr. Stan Wells  
Mr. Dan Robertson ✓  
Dr. Clare Mahan  
Dr. Albert Sollod

A. APPRAISAL OF EXPERIMENTAL DESIGN OF ORIGINAL SURVEY

DEFINITION:

The small ruminant project was instituted on the basis of an original study by the "Société d'étude pour le développement économique et social" (SEDES) in 1974. In 1977, The United States Agency for International Development (USAID) and l'Office Malien du bétail et de la viande (OMBEVI), set out to study the socioeconomic, technical and environmental aspects of small ruminant production in Mali through a project entitled MALI-Livestock II. The survey was to take place in three phases with time limits set for each phase.

Phase I

Phase I of the project was to involve an analysis of available references and to prepare a preliminary survey. A consultant firm, "Chemonics International", was hired; it produced a report on existing documentation and presented a model form to be used in the preliminary study.

Although this report, dated March, 1980, gave a large list of good references, it had several shortcomings. The references were not made available to OMBEVI, and an important small ruminant production project in progress at the International Livestock Center for Africa (ILCA in Mali) was not cited. Statistical analysis of data was not considered by other than tabulation methods. Livestock production parameters for small ruminants, such as precocity, fertility, proliferation ratio and fecundity, were not discussed. No evaluation of the data from the preliminary survey was made. Fortunately, the poor model that was originally developed was discussed at length and a survey instrument and a method for its use were later developed by OMBEVI.

## Phase II

The survey instrument was based in part on the preliminary study and the model and incorporated two design flaws:

- 1) No plan for compiling data other than by hand tabulation was envisioned.
- 2) Vital animal science parameters were lost through poor questioning techniques

In its final form, the survey instrument had 36 pages of information and took 2 hours to complete in the field. Field workers were trained for 2 weeks by a veterinarian and other experts in sociology, animal science and agriculture.

The ideas and experimental design in the final survey instrument were good, considering the two major drawbacks already mentioned. The adaptation of the survey instrument to the human and animal population in Mali is the best possible effort given the socioeconomic factors to be considered in carrying out such a study. Phase II is now being completed with technical assistance and computer analysis by Tufts University.

## Phase III

A third phase for follow-up studies has not yet been carried out, but the following combination of study and implementation activities is recommended by Tufts University for future funding by USAID.

### A. Controlled herds during the cold dry season.

1. Didactic education on the benefits of controlling the herd of small ruminants throughout the year.

- a) decrease losses due to theft
- b) decrease accidental deaths
- c) control breeding

2. Herding techniques using minimal labor

- a) natural boundaries
- b) use of dogs
- c) marking animals with permanent identification

B. Adaptation of sanitary technique to small ruminant production

1. Deparasitization

- a) external mange
- external lice
- external mycosis
- b) internal
- anthelmintics

2. Accurate diagnosis of bacterial and viral agents and appropriate vaccination prophylaxis.

3. Theriogenology

- a) diseases of the dam
- b) diseases of the newborn
- c) abortions
- d) nutrition
- e) optimum breeding season, gestation period, gestation interval, age of 1st gestation, age of last gestation
- f) castration or controlled breeding of all males
- g) genetic selection

4. Didactic education about veterinary science

Improved nutrition for small ruminants

1. Maximum use of available biomass, especially legumes
2. Special feeding of most demanding age/reproductive classes
3. Recycling of energy in the agricultural cycle

D. Extension program

Based on the small ruminant survey, a project may be implemented in one or several regions, in which extension agents are trained (or given further training) in nutrition, sanitation, breeding and disease control under confinement rearing conditions. The project should be modelled on the successful Togo Small Ruminant Project which is funded by USAID/Entente Fund (see Evaluation of the Togo Small Ruminants Project, Sollod and Rosengard, 1982, Development Alternatives Inc., Washington, D.C.).

STATISTICAL DESIGN OF THE ORIGINAL SURVEY INSTRUMENT:

The villages, selected at random, were stratified according to numbers of small ruminants present and according to the human population. Two strata were used. One concerning the sedentary population; the other concerned the migratory population. The sub-strata for the sedentary herds of small ruminants were:

- 200 animals per village
- 200 to 399 animals per village
- 400 to 599 animals per village
- 600 to 999 animals per village
- 10,000 and above animals in village

These sub-strata appeared to represent the villages fairly accurately,

The migratory populations were separated into only three sub-strata according to herd size:

- 1,000 - 1,999 animals per village
- 2,000 - 4,000 animals per village
- more than 5,000 animals per village

By calculating the average herd size for migratory animals in several areas, it was found that the strata did not closely approximate total animal numbers.

Census data were referenced for people to 1976 and for herd size in 1977. Using a sampling fraction of 0.1, a systematic random sample (every <sup>nth</sup> unit) was taken within each stratum. A total of 1,007 villages was chosen through random sampling via site visits to each of the villages and 5,000 herds were identified. Sixty nomadic herds were also surveyed at their temporary points of concentration in the sahel.

The small ruminant project was destined to begin in 1977 and to end 3 years later. The project, in fact, began in 1979 and to this date has not been completed. The major reason for this discrepancy has been communication difficulties between the OMBEVI and USAID.

#### B. STATISTICAL ANALYSIS

The survey instrument was not designed for computer processing by a data entry clerk, and it is estimated that 60 person weeks of coding onto 80 column code sheets would be required to prepare the data for key punching or other means of computerized data entry.

OMBEVI has tabulated by hand the responses to the items on the questionnaire and has prepared tally sheets by village, sector and region. From these tally sheets, histograms or frequency polygrams could be constructed to give simple

descriptive statistics. Two such histograms are shown in Figure I, in which the mortality rate by age in male and female sheep for the region of Tombouctou and sector of Tombouctou can be seen.

(Figure I is attached at the end of report)

#### COMPUTER PROGRAMS

There were no computer programs to be analyzed.

-Recommendations for computer analysis of existing data:

- 1) The coding of data by sector from the tally sheets onto new forms is necessary. This would best be accomplished by the regional "cadre" of OMBEVI. There are approximately 200 person hours of coding to be done. There would be 46 forms, that is, one per sector.
- 2) The coded data would then be sent to Tufts University.
- 3) Upon receipt at Tufts, the coded data would be key punched; this would require approximately 50 hours.
- 4) The analysis would be accomplished by Dr. Mahan, Dr. Sollod and other necessary experts.

It would be advisable to send one person from OMBEVI with the data to aid in the analysis. One of the Malian project supervisors would be most helpful in coordinating the regional socioeconomic differences in Mali with the questions asked in the analysis.

5) The complete analysis would be returned with the representative from the OMBEVI and the final report would be written by OMBEVI. The estimated cost of coding, key punch and analysis is \$11,000. This estimate does not include travel or living expenses for the OMBEVI representative.

D. ADVICE ON MARKET SURVEY

Completion of the marketing survey should only be undertaken with the understanding that the markets available for study are government controlled and government imposed taxes at these markets encourage the existence of clandestine markets. Only the official markets would enter into the data obtained and so a significant part of the small ruminant economy would not be surveyed. A method to quantify this gap in small ruminant production and sales will be discussed in the future subsector activities.

A pre-coded questionnaire has been developed to facilitate the market survey, so that data are already prepared for computer entry.

E. ADVICE ON FUTURE SUBSECTOR ACTIVITIES

In consideration of the limitations of the study, future subsector activities are indicated to improve the existing data. All future programs should receive technical assistance and all survey models need interdisciplinary evaluation in the areas of socioeconomics, animal production, health and computer science. The types of activities which should be supported include field research and small scale testing of emerging technology.

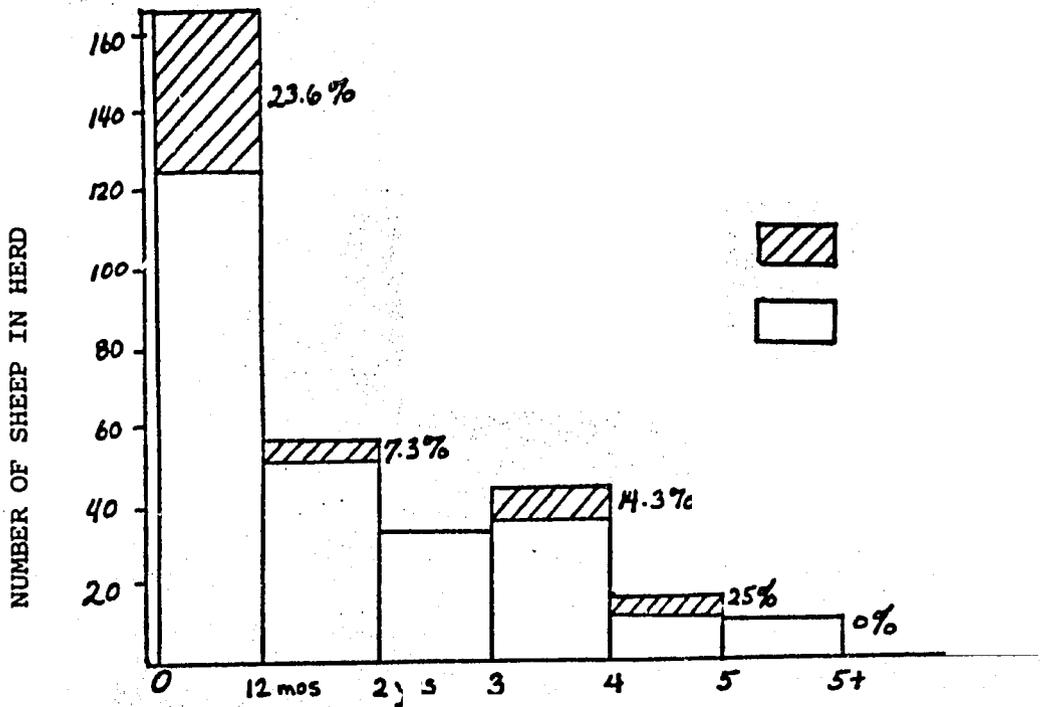
The "Small Ruminant Study" already in progress in Mali would benefit from the continuation of Phase II. According to Sollod (1982), experience with livestock development projects in other parts of Africa indicates that ten years or longer are needed to make a worthwhile contribution to livestock production in pastoral systems. Much work has already been done with a market study at the farm gate level. Therefore, computer analysis of the existing data and completion of the marketing survey with consideration of the limitations of controlled markets taken would permit a completed evaluation of small ruminants in Mali.

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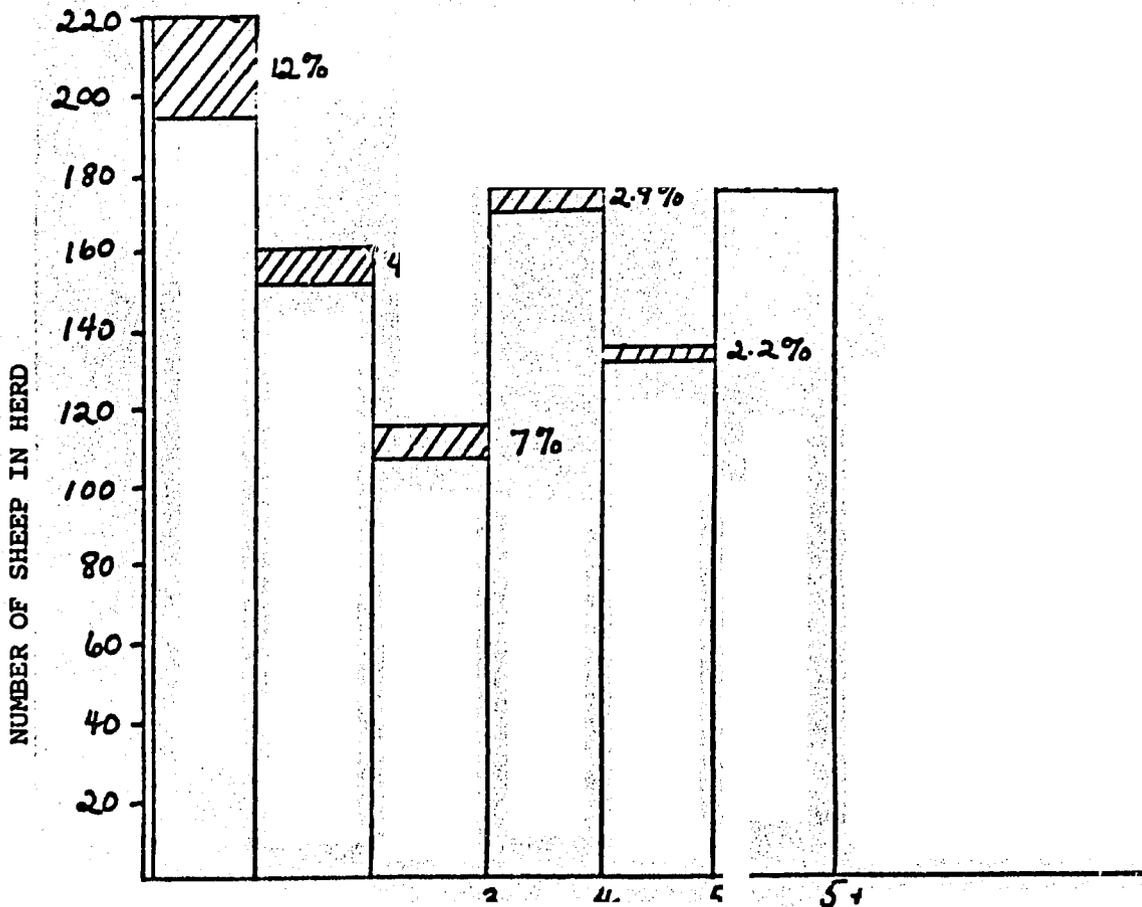
A method to quantify the amount of small ruminant production sold in urban markets could be obtained through an estimation of the small ruminants consumed in Mali. Due to the difficulty of accurately calculating offtake in West Africa, subtracting those small ruminants consumed in Mali and those sold in controlled government markets from the total produced in Mali would give an estimation of the importance of clandestine markets. Consumption of small ruminants could be calculated from nutritional studies of the protein content in the diets of the Malian people.

FIGURE I

Mortality by Age in 320 male sheep  
Sector Tombouctou  
Region Tombouctou



Mortality by Age in 987 female sheep



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