PD-AAW-990

CLASSIFICATION

PROJECT EVALUATION SUMMARY (PES) — PART I

Report Symbol U-447

1. PROJECT TITLE
WESTERN PROVINCE SMALL FARMER PRODUCTION
002994

2. PROJECT NUMBER
611-0205 XD

3. MISSION/AID/W OFFICE
USAID/ZAMBIA

4. EVALUATION NUMBER (Enter the number maintained by the reporting unit e.g., Country or AID/W Administrative Code, Fiscal Year, Serial No. beginning with No. 1 each FY) 611-87-0

☐ REGULAR EVALUATION ☐ SPECIAL EVALUATION

5. KEY PROJECT IMPLEMENTATION DATES
A. First PRO-AG or Equivalent FY 83
B. Final Obligation Expected FY 83
C. Final Input Delivery FY 87

6. ESTIMATED PROJECT FUNDING
A. Total $ 483,000
B. U.S. $ 483,000

7. PERIOD COVERED BY EVALUATION
From (month/yr.) OCTOBER, 1983
To (month/yr.) AUGUST, 1986
Date of Evaluation Review JULY/AUGUST, 1986

8. ACTION DECISIONS APPROVED BY MISSION OR AID/W OFFICE DIRECTOR

A. List decisions and/or unresolved issues; cite those items needing further study. (NOTE: Mission decisions which anticipate AID/W or regional office action should specify type of document, e.g., airgram, SPAR, PIO, which will present detailed request.)	B. NAME OF OFFICER RESPONSIBLE FOR ACTION	C. DATE ACTION TO BE COMPLETED
1. Management Training for the Project Manager and basic accounting for the Project Accountant.	AFRICARE: J. Holtam	12/31/87
2. Determine whether the Beekeeping Division is setting aside 20% of every Kwacha in a separate account to repay the AFRICARE loan.	AFRICARE: J. Joltam BEEKEEPING DIV: E Munthali	12/31/87
3. Determine if market analysis has been done leading to the project to become self-sustaining.	AFRICARE: J. Holtam	12/31/87
4. Review quarterly inventories for adequacy.	BEEKEEPING DIV: E. Munthali	12/31/87
5. Conduct a cost analysis of operation of plant in Kaoma.	BEEKEEPING DIV: E. Munthali AFRICARE: J. Holtam	12/31/87 12/31/87
6. Review training of trainers.	AFRICARE: J. Holtam	12/31/87
7. Re-examine the qualitative and quantitative aspects of the project after one year of operation.	BEEKEEPING DIV: E. Munthali AFRICARE: J. Holtam	12/31/88

9. INVENTORY OF DOCUMENTS TO BE REVISED PER ABOVE DECISIONS

- ☐ Project Paper
- ☐ Financial Plan
- ☐ Logical Framework
- ☐ Project Agreement
- ☒ Implementation Plan e.g., CPI Network
- ☐ PIO/T
- ☐ PIO/C
- ☐ PIO/P
- ☐ Other (Specify)
- ☐ Other (Specify)

10. ALTERNATIVE DECISIONS ON FUTURE OF PROJECT

- A. ☐ Continue Project Without Change
- B. ☐ Change Project Design and/or ☒ Change Implementation Plan
- C. ☐ Discontinue Project

11. PROJECT OFFICER AND HOST COUNTRY OR OTHER RANKING PARTICIPANTS AS APPROPRIATE (Names and Titles)

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ASSOCIATE PROFESSOR OF ENTOMOLOGY

MR. ALVIN D. BLAKE - ECONOMIST - U.S. DEPARTMENT OF COMMERCE
BUREAU OF ECONOMIC ANALYSIS, WASHDC.

12. Mission/AID/W Office Director Approval

Signature

Typed Name: Ted D. Morse

Date: January 7, 1988

AID 1330-15 (3-78)

XD-AAU-990-A

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EVALUATION REPORT

Small Farmer Production Program
Western Province
Republic of Zambia

(Grant # 611-G-3019)

By John T. Ambrose PhD
and
Alvin D. Blake

Submitted to:
U. S. Agency for International Development
September 5, 1986

"Improving the quality of life in rural Africa through the development of water resources, increased food production and the delivery of health services"

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INTRODUCTION

The U.S. Agency for International Development, in October 1983, granted Africare $482,283 (611-G-3019) to implement a honey and beeswax production program in Zambia which is formally known as the Western Province Small Farmer Production Project. The project proposal was based on a 30-month implementation plan, but the grant was made for a three-year period ending on August 31, 1986. Africare has conducted the project in cooperation with the Beekeeping Division of the Department of Forestry in the Ministry of Lands and Natural Resources.

The grant agreement called for a major evaluation to be conducted during the closing months of the project. It was agreed among Africare, the AID Mission in Zambia and the Beekeeping Division that this evaluation should be carried out by two persons, each concentrating respectively on training/extension and administration/financial analysis, with a view toward determining whether there were sound reasons to justify extension of the grant.

Africare selected two outside evaluators: Dr. John T. Ambrose, of North Carolina State University, who has extensive professional background in apiculture in the United States and Third World; and Alvin D. Blake, an economist with the U.S. Department of Commerce's Bureau of Economic Analysis and former and former Peace Corps Volunteer in Cameroon. Dr. Ambrose visited Zambia July 4-17 and focused his attention on training and extension aspects of the project

(See Section I). Mr. Blake visited the project between July 13 and August 4, overlapping with Dr. Ambrose by about one week. His report (Section II) focuses on administration of the project and an economic and financial analysis.

SECTION I: Extension and Training

John. T. Ambrose PhD

INTRODUCTION

In October of 1983, funding was authorized to begin the Africare sponsored project in Zambia entitled, "Small Farmers Production Project (Beekeeping)" which was originally termed "Honey and Beeswax Production and Processing in the Western and Central Provinces of the Republic of Zambia". The stated purpose of the project was to support the development of village-based production, processing, and marketing of honey and beeswax in Zambia's western and central provinces. The project was established for a duration of approximately 30 months with a scheduled evaluation by an apiculturist sometime during the 24-30 month period of the project. My evaluation trip to Zambia in July 1986 was in the role of the professional apicultural consultant assigned to evaluate the project.

I spent approximately three weeks visiting the Africare offices in Washington, D. C. and in Zambia in my role as a project evaluator. Because of the scope of the project there were two assigned consultants; myself as the apicultural evaluator and Mr. Alvin Blake as the evaluator for the administrative and financial functioning of the project. Mr. Blake and I met briefly in Washington, D. C. at the Africare offices prior to my journey to Zambia, and he later met me in-country at Kaoma so that we did have some overlap in Zambia.

After discussions between Mr. Blake and myself and with the Africare officials, both in Washington, D. C. and in Lusaka, it was agreed that Mr. Blake and I would each be primarily responsible for different aspects of the project evaluation. Mr. Blake would handle the administrative and financial review of the project and I would be responsible for the extension, training and technical apicultural considerations of the project. However, Mr. Blake and I did make a concerted effort to review our findings with each other during our overlapping stay in Zambia. Nevertheless, this report is prepared from my perspective as an apiculturist and deals primarily with the assigned areas of responsibility, and the report should be combined with the report being prepared by Mr. Blake for a complete evaluation of the Africare beekeeping project.

DISCUSSION

The responsibilities for evaluation the Africare Beekeeping Project in western and central Zambia were generally allocated as follows: administrative and financial considerations to Mr. Blake and extension, training and techological consideration to me. In certain areas of evaluation, such as development of the project along the predicted time frame, it was difficult to assign responsibility for oversight to one or the other of the consultants. In addition, it was agreed that a final report would be prepared combining the input of the two consultants. Therefore, I have provided my evaluations and suggestions for a number of different project topics and my input in those areas should be combined and considered in combination with the comments of Mr. Blake. For ease of discussion, I have divided my comments into specific project topics.

I. Project Development in Meeting Planned Milestones:

Superficially, it would seem obvious that the project is anywhere from 12 to 18 months behind schedule in meeting many of the planned milestones, such as the completion of the honey processing factory at Kaoma and the construction of housing for the various project personnel. However, these delays become less dramatic if one considers the actual assignment of management personnel to Kaoma as opposed to the "official" start-up of the project. Funding of the project was provided in October 1983 but Mr. Muntholi, the project manager, was not assigned until August 1984, and he was not actually "in-residence" at Kaoma until May 1985. For approximately 9 months the project was being managed from Mwekera. Even the skills and dedication of a competent manager such as Mr. Muntholi were not sufficient to offset the project problems and delays caused by the physical distance between Kaoma and Mwekera.

Every problem has extenuating circumstances and the assignment of a project manager to the project site is no exception. The delay in providing housing for the project manager at Kaoma was one such extenuating circumstance. However, the delay in moving the manager to the project site probably did contribute to some of the other time slippages in the project. This evaluation is not meant to be a reflection on Mr. Muntholi because it is obvious that since his assignment to Kaoma the project has made good progress.

The remaining housing projects and the factory construction at Kaoma were nearing completion during my July 1986 visit, and it is not unrealistic to assume that those building projects will be completed by late August. The completion of the various construction projects are prerequisites to the primary goals of the project in that the full complement of training personnel (beekeeping officers) and honey processing facilities at the factory are needed to increase honey and beeswax production in the project area. For example, the beekeeping officer has not yet been assigned to Lukulu, one of the primary project sites, because of the delay in providing adequate housing. The lack of an officer at Lukulu obviously affects beekeeper recruitment and extension work in that area. Likewise, the delay in completing the factory at Kaoma affects the project's ability to process honey for resale and serves as a bottleneck to the project's growth.

Recommendation: Based on the delays in construction and the delay in physically stationing the project manager at the project site in Kaoma,

I would recommend that project milestones be evaluated as if Africare were at the completion of the first year of the project, which is specified as the milestone for building construction completion in the project planning document.

II. Beekeeping Factory Facilities at Kaoma: The factory was in the final stages of construction during my visit to Kaoma. The delays in material availability seemed to have been solved by the project manager and the applicable contractors. A few pieces of window framing and hardware were still on order but delivery seemed to be certain.

The building itself was modeled after the honey factory in use at Mwekera and it should be adequate for the planned use as a honey beeswax processing facility. The location of the facility in Kaoma which is in the district center and its availability to adequate road transportation should make it a useful processing center. The processing equipment for the factory was still in Mwekera and a list of the equipment was not available in Kaoma. However, discussion with Mr. Zulu and Mr. Muntholi convinced me that the factory will be reasonably well outfitted for its intended purpose. However, there are several potential problem areas which should be considered.

One minor problem deals with the handling of beeswax. The processing equipment does not include any type of mechanical wax melter. Without such a melter, the project personnel will have to process the beeswax in much the same was as do the village beekeepers. This process is slow and does present some risk in that the wax is generally heated in a water filled container over an open flame. Beeswax is flammable and an open flame does present a potential hazard. The need for processing is evident in that the producer price for processed wax is three times as high as the price for beeswax which is simply washed and dried (K3.0 vs. 1.0). In addition, the processed wax is not subject to infestation and destruction by the wax moth pest (*Galleria mellonella*).

The other problems or potential problems deal with honey processing. One potential bottleneck involved the number of honey presses for the factory. At the present time the project has only five presses for the initial separation of the honey from the beeswax comb. At the Mwekera honey processing factory, it is a typical arrangement for one individual to work with five or six presses. Since there is some time delay (which is temperature dependent) in waiting for the pressed wax to release its honey, an individual may be filling or emptying one press while other presses are draining. A shortage of presses would be an obvious bottleneck to the subsequent honey processing operations in the factory. A second potential problem is that honey bees will be attracted to the factory by the odor of honey while it is being processed. This attraction can result in large numbers of bees entering the building whenever the doors are opened to admit personnel or honey stores. A properly positioned fan, as described in the following recommendations, would easily solve this problem.

A third problem with the factory concerns the processing of honey from the *Julbernardia* crop. All honey will eventually change from a liquid to a solid form, a process which is called granulation if it occurs naturally and which is called crystallization if it is controlled by man. Granulated or crystallized honey is not necessarily a problem. In fact, some European countries and Canada place a premium on good crystallized honey. The real

problem occurs when honey granulates during its processing. It is very difficult to work with a granulated honey unless it is reliquified. Julbernardia honey will granulate and the process had already begun with the stored honey at Kaoma during my visit.

One factor which contributes to the rapidity of honey granulation is temperature. Temperature between 40-60 degrees F will enhance the process and that temperature range is very common in Kaoma during July when much of the crop is being processed or awaiting processing at Kaoma. In addition, the relatively cold July temperatures will slow the processing of even ungranulated honey at the Kaoma facility. Honey at room temperature will flow at a rate at least 5-10 times as fast as will honey which is at 50 degrees F. Cold honey slows down processing. The higher ambient temperatures during the processing of the Brachystegia crop would prevent the granulation problem.

Recommendations:

1. Provide the Kaoma honey processing factory with a wax melter. Such a unit would serve to reduce the potential threat of a beeswax fire as presented by open flame processing and would improve the efficiency and speed of wax processing. The cost of an adequate unit should be approximately $750 or less.

2. Provide the Kaoma honey processing factory with a minimum of 10 honey presses. This would minimize the possibility of honey pressing becoming a major bottleneck in the processing of honey.

3. Install a small electric fan (approximately 10-12 inches in diameter) in the wall of the honey factory which is opposite from the doors. The fan should be located at a height of at least eight feet above the ground. This fan will disperse the odor from the stored and processed honey to one side (outside) of the factory. Because bees are attracted to honey by odor, the bees will tend to aggregate on that side of the building which will reduce the entry of bees into the factory whenever the doors are opened. Of course, this assumes that the windows on the side of the factory with the fan will be either closed or screened. The plans for the factory already call for the installation of bee escapes to handle those bees which do manage to enter the building.

4. The potential problem of granulated honey could become a major obstacle to the operation of the processing plant at Kaoma. This is particularly true of the Julbernardia crop in July. One obvious solution is to provide some method of maintaining a minimum constant temperature for the stored honey. A method of preventing the ambient temperature from falling below 65 degree F would do much to minimize the problem of granulation during honey storage and processing. One method would be to heat that portion of the factory which holds the Julbernaridia honey prior to processing. I have inquired into the equipment necessary for a solar heating system and will provide that information when it is available. (See also following recommendation).

5. The honey factory at Kaoma was initially designed without any plans for external storage of other bee related equipment and supplies, such as

veils, coveralls, containers, etc. In addition, a portion of the external storage might be used to store honey prior to processing and/or after bottling. It might be desirable to divide such a storage building into two sections and provide facilities for heating one side so that it could be used for stored honey. The heating would only be necessary during the Zambian winter, primarily the month of July. I have also made inquiries into solar heating equipment for this purpose and will provide information when available.

III. Extension Work and Recruiting Clientele (Village Beekeepers): For clarity of of discussion, a distinction is made in this report between the terms extension work and training. Extension work will be used to cover educational work with the various beekeepers by the beekeeping officers staff (the term staff includes project beekeepers employed by the Forestry Department). Training will refer to formal and informal schooling provided to the beekeeping officers and staff.

Since the inception of the project, Mr. Muntholi reports that he has recruited 356 new beekeepers (as of 7/4/86) and that he expects to have approximately 500 new beekeepers by the end of the calendar year. The project planning document predicted that a total of 950 new beekeepers would be recruited over the three years of the project with 290 during Year 1, 580 during Year 2, and 950 by the end of Year 3. Remembering that Mr. Muntholi has only been permanently stationed at Kaoma since May 1985, then a current recruitment figure of 356 new beekeepers with a projection of 500 by the end of 1986 is a very respectable achievement.

In addition to the number of beekeepers is the interest of the beekeepers in the project. During my stay in Zambia I was able to visit beekeepers in the villages of Mayukwayukwa, Mukuakiki, Nakayembe as well as in Mumbwa and Kaoma. All of the individuals I met were very enthusiastic about the project. This enthusiasm was demonstrated by their sale of honey and wax to the project and the purchase of beekeeping equipment with some individuals paying for the equipment in only one year as compared to the three year approved loan program. An additional and very dramatic evidence of en-// walked over 100km to tell the project personnel that his village had honey ready for sale to the project.

Extension work by the project is of two general types. The first is a type of "hands-on" training at the villages where the project staff covers such things as bark hive construction, honey collection and grading, and beeswax processing. This extension work serves two distinct purposes in that it shows the beekeepers how to make multiple hives from one tree which reduces the destruction of trees, and it demonstrates the techniques for collecting honey and wax of good quality and good market value. The extension work at the village level does not really deal with actual bee management. There are two reasons for emphasizing hive construction and product handling instead of bee management. One is that there are more immediate gains to be realized from this type of approach in collecting a marketable honey/beeswax crop, and the second reason is that the project personnel do not really have any real training in bee management. In fact, many of the experienced beekeepers may know more about beekeeping than do the project personnel (see IV. Training of Beekeeper Project Officer and Project Beekeeper.)

// enthusiasm was the arrival of a beekeeper from the village of Nakyembe who had

A second type of extension work is performed at the Farmer Training centers. To date, Mr. Muntholi has conducted two extension programs at the Farmers Training Center which is east of Kaoma. Each of those sessions lasts for one week and 41 beekeepers have completed one of the courses. The material at the FTC covers various bee management topics as well as hive construction and product handling. A copy of the syllabus is attached to this report as Appendix A. The FTC is a good resource for extension work but the beekeeping project must compete with other projects for time and space at the Center. Mr. Muntholi has requested dates at the Center for the remainder of the year which should help to regularize his use of the Center. It should be noted that there is an actual beekeeping Training Center at Kabompo which is staffed by a beekeeping officer. The syllabus used at Kabompo is the model for the beekeeping extension course at the Farmers Training Center.

Recommendations:

1. It is difficult to determine how many beekeepers are actually being reached at the village extension programs. I would recommend that Mr. Muntholi include a summary of the number of such programs and the number of individuals at each session in his monthly reports. Based on the present training of his staff, I believe the subject material at the sessions is appropriate.

2. The large geographic area served by the Project makes it difficult to transport beekeepers from some of the villages to the Farmers Training Center for the one-week extension programs. One suggestion would be to consider the use of the Beekeeping Center at Kabompo for those beekeepers who are closer to that center than they are to the FTC. This may be particularly appropriate when Lukulu is manned by the Project. It is my understanding that the current staff at Kabompo would handle the actual instruction of the beekeepers.

3. The use of some teaching aids such as wall charts on beekeeping at the training centers would probably enhance the extension programs. I would be pleased to provide a list and sources of such material.

IV. Training of Project Beekeeping Officers and Project Beekeepers: At the present time the Zambian Forestry Department, Africare and the IRDP (Integrated Rural Development Project) are all involved in promoting beekeeping in Zambia. The basic goal of all of the participants is to increase the earnings of the nation's beekeepers and potential beekeepers. An integral key to the success of that goal is to provide relevant training (extension work) to the beekeepers.

The Forestry Dept. currently has approximately 30 officers in its beekeeping division and these are the personnel who must provide the extension training to the beekeepers. Unfortunately, only a few key persons in the beekeeping division have themselves received any suitable training in beekeeping. All of the officers have completed the two-year certificate program at the forestry school in Mwekera, but that program includes only an introduction to beekeeping. At the present time Mr. Zulu, the CBO, has only five beekeeping officers who have received any relevant beekeeping training, and none of the officers in the Africare project area fall within that category.

The extension work presently being provided by the Africare personnel seems to be appropriate based on the needs of the village beekeepers and the training of the Beekeeping Officers (as described in Section III, Extension Work and Recruiting Clientele as described in this report). However, that situation will worsen shortly if the project hopes to improve beekeeping efficiency of the project clientele.

Recommendations:

1. The immediate short term solution to deficiencies in beekeeping expertise of the Forestry Department's beekeeping officers would be a short-term, intensive training program for those individuals. Such a program is described and justified in Appendix B of this report. Such a training program is not designed as a complete response to the training needs of the beekeeping officers but it would go a long way in providing an effective response to the current problem.

2. A more permanent solution to the training problem in beekeeping would be to construct a more formal and long-term training program for current and new beekeeping offiers. The Zambian Forestry Department has tentatively approved, in theory, the creation of a two-year diploma program for beekeeping officers. This course would be offered in lieu of the two-year forestry course and it would be structured for beekeeping officers. Obviously, the course would still maintain some association with the forestry course and both courses would be taught at the Forestry facilities in Mwekera. I would be interested in developing a proposal and a syllabus for such a course.

3. Mr. Muntholi, the manager of the Africare beekeeping project is a very capable individual who has made great strides in advancing the project work. However, he does not have any significant formal training (education) in either management or in apiculture (beekeeping). I believe that the first priority should be placed on providing Mr. Muntholi with some management training on a short-term basis. In addition, it would prove very beneficial if he were to receive advanced educational training in the area of apiculture. One suggested method is to place Mr. Muntholi in a two-year Master's level graduate program where he could major in apiculture (actually entomology) and also minor in an appropriate discipline such as management or extension work.

4. Provide a reference beekeeping library for the Africare project staff at Kaoma with smaller reference collections at the other sites. (See Appendix C of this report for a suggested listing).

V. Reporting: Generally the monthly and annual reports prepared by Mr. Muntholi are very informative and easy to read. The information on honey and beeswax transactions and Mr. Muntholi's travel itinerary are very helpful in obtaining an overview of the project. Apparently there have been some minor problems in either report timeliness or coordination in that the 1985 Annual Beekeeping Report of the Forestry Dept. notes that it doesn't include data from the Kaoma/Africare project.

Recommendations:

1. Insure that all the reports are prepared in a timely manner.

2. Include data on extension work in the monthly reports and summaries submitted by Muntholi. This would provide a better overview of the project work. This matter was discussed with Mr. Muntholi and he agreed to its usefulness.

VI. Frame (modern) Beehives: At the present time all of the extension work being performed by the project personnel utilizes bark hives as the domicile for the honey bees. Some frame hives are in use by the Forestry Department at Mumbawa but these are primarily for demonstration purposes. Logistical problems, particularly transportation and equipment deficiencies, limit the current project work to the use of bark hives. However, this may very well change with time as the project develops and the market for project honey continues to grow.

It is feasible to assume that within a few years some beekeepers in the immediate vicinity of the project centers (Kaoma, Mumbawa and Mayukwayukwa) may be able to efficiently utilize frame or modern beehives. Some of the large equipment items, such as honey extractors for removing honey from the frames without destroying the beeswax, could be located at the project centers and used by those beekeepers who have frame hives.

Recommendation: It is suggested that small (10-12 beehives) apiaries of frame beehives be established at each of the project sites (including Mayukwayukwa) during the next year. These hives would provide the project beekeeping officers and project beekeepers with some experience in managing honey bees in frame hives and in comparing the honey production of bees in frame hives vs. the traditional Zambian bark hives. In addition, these apiaries may be used to acquaint the village beekeepers with the effectiveness of the frame hives in honey production.

VII. Forestry Dept. Apiaries at Project Centers: Upon the initiation of the Africare beekeeping project, The Forestry Department transferred the responsibility for approximately 1,000 bark beehives to the beekeeping officers conducting the Africare project. These hives are divided between three centers with 400 at Mumbwa, 300 at Kaoma and 300 at Mayukwayukwa. The total honey crop harvested from the three sites as of early July 1986 was less than 300kg, a very disappointing yield. Even though these hives are not the direct responsibility of the Africare Project, some consideration should be given to the honey production of these hives and the reasons for the "low" honey production.

All three of the centers' apiaries have been plagued by a combination of thieves, fire, and distance of the actual hives from the centers. Many

of the hives are located significant distances from accessible roads making visits to the hives a difficulty which affects hive management. In addition, the difficult access also increases the possibility of theft because it is difficult to routinely observe the hives by the project personnel. At the present time, the 1,000 or so Forestry department bark hives are probably creating more work for the project personnel than the benefits justify. It is essential that the Project and the beekeeping officers maintain some hives for extension, demonstation, and even research purposes, but keeping hives as a source of honey should be given some serious reconsideration and the benefits compared to the required management efforts.

Recommendations:

1. The number of bark hives maintained by the beekeeping officers assigned to the Africare project should be reduced to a more manageable number (perhaps 100 hives/center). The value of small apiaries at each of the project center locations is obvious in that they could be used for extension and research purposes. However, that value is reduced when the number of hives reaches such a large number that it requires that time be spent on hive management which should be devoted to the project responsibilities.

2. All of the personnel assigned to the Africare project including beekeeping officers and project beekeepers should utilize the center apiaries to obtain practical experience in bee management. Of course, this experience should be obtained with the assistance of a qualified individual.

VIII. Transportation: Adequate transportation is vital to the success of the project. The ability of the project personnel to reach the villages in the Africare project area and to transport honey from the villages to the various marketplaces is essential to the project's success. During my visit to Zambia, the project was utilizing one truck and a land cruiser as project vehicles. In addition, a second land cruiser was due by the end of the month (July) to replace a project vehicle which had been previously destroyed in an accident. The complement of three vehicles should provide the project with sufficient capability and capacity to pick up and transport honey, beeswax, and various equipment and supply items. The land cruisers can be used on the unpaved roads to pick up and deliver honey, wax, etc. at the villages and the truck can be used for larger shipments on the paved roads.

The use of the project vehicles is not limited to transporting honey, wax and related equipment and supplies. The vehicles are also used for administrative and extension responsibilities. Obviously, the project personnel must have a means to reach the villages for project work; however, such transportation using one of the land cruisers or the truck is very expensive in terms of fuel and vehicle depreciation. A look at the project monthly reports shows that in many months the project's revolving fund is expending as much or more money for transportation as it is for the purchase of honey and wax. Careful consideration must be given to minimizing all but essential travel and to find alternatives modes of less expensive travel where possible. As stated previously, travel is essential to the success of the project but the reality is that all travel is currently

financed by the project revolving fund, and that fund is currently depleted.

In September of 1985, the project did receive 10 bicycles which were distributed among the beekeeping officers and staff on a loan basis. Each individual is responsible for paying back the purchase price of his bicycle to the project (revolving fund) at the rate of K10.35 per month over a two year period. The availability of the bikes definitely makes extension work easier and should provide more frequent access to the village beekeepers by the project staff at a minimal transportation cost. In addition, many of the village beekeepers are also interested in obtaining bicycles so that they may use them as transportation to notify the project centers when honey is ready for pickup and to transport honey from the field to the villages (see section IX. Equipment for Village Beekeepers).

Recommendations:

1. Travel, using the project truck and land cruisers, should be kept to a minimum to reduce transportation costs. Whenever possible, the project staff should utilize the assigned bicycles for extension work and other activities which do not require the capability to transport heavy loads and which are within a reasonable commuting distance. For example, the bicycles should be used whenever possible for trips to the Forestry Dept. apiaries in the project area.

2. Project plans to purchase three motorcycles are strongly endorsed. Such vehicles should provide an alternative to truck/auto transportation at a reduced price to the project for fuel, maintenance and depreciation. The distribution of the three motorcycles among the project centers is unclear but Lukulu and Mayukwayukwa and Mumbwa would seem to be reasonable allocations with all of the land cruisers and truck stationed at Kaoma. The motorcycles could be used for extension and administrative type work as well as vehicles for transporting small amounts of honey and wax. The motorcycles would fill the transportation gap between the bicycles and the more expensive motor vehicles.

3. At the present time all of the project transportation costs, with a few exceptions, are being charged to the Africare revolving fund. The money to operate the vehicles must come from somewhere but the revolving fund may not be the obvious source. A primary goal of the revolving fund is to provide cash for the purchase of honey and wax and the fund cannot serve that purpose if its resources are depleted due to transportation costs. I am not competent to suggest an alternate source of funding for transportation, but I must point out that the project cannot operate if it cannot purchase and resell honey and wax.

4. Some consideration should be given to involving non-project personnel in the transportation needs of the project. One area of possible involvement centers around the project's production and sale of beeswax. The wax coming out of the project is of very high quality and the demand for wax in-country exceeds the available supply. The visit by Mr. Ntambo, the purchasing manager, from Continental Products (Zambia) Limited to Kaoma during my visit there and his eagerness to buy wax is a good example of the product's popularity. The project might consider contracting with a firm such as Continental to buy a large share of the wax production which would include pickup

of the wax in Kaoma In addition, it might also be possible to have the firm deliver some of the bottled honey to a dropoff point in Lusaka at the same time that they were transporting the wax.

IX. Equipment for the Village Beekeepers: As the beekeeping project has developed, so has the clientele's need (desire) for protective equipment to be used in working the bees. The project has received 500 complete sets of beekeeping equipment including coveralls, veils, gloves, and smokers. Approximately 1/2 of the sets have been distributed. The equipment is sold to the individual beekeepers at a cost of K151 per set and a repayment schedule of K37.35 per season (two seasons per year) has been established.

The beekeeping equipment has been enthusiastically received by the beekeepers. During my visits to the various villages, I saw many beekeepers making payments on their loans and they seemed to be very pleased with their equipment. In fact, I met several beekeepers who has already completely repaid their loans--well ahead of schedule.

Several of the beekeepers commented (during my trips to the villages) that they were also interested in buying bicycles. The bicycles could be used for two purposes: (1) to make trips back and forth to the beehives from the villages, and (2) to make trips to the project center to notify the project pesonnel when honey/wax was ready for pickup. Many of the villages are at considerable distances from any of the project centers, and I have previously mentioned the example of the beekeeper who walked over 100km to tell the project staff that his village's honey was ready for pickup. In addition, the use of bikes by the beekeepers would not only shorten their commute times in visiting their beehives, but the bikes could also be used to carry small amounts of honey from the apiaries to the villages. The beehives tend to be scattered over large distances and a bicycle would allow a beekeeper to visit more hives on a regular basis which would increase management capability and reduce the opportunities for thieves to steal the hives.

One question to be considered in obtaining any type of beekeeping equipment is whether the item can be produced in country. Two Zambian companies do produce some of the discussed equipment: Salko Engineering in Kitwe makes smokers and James North Co. in Kitwe makes gloves and veils. However, several individuals complained to me about the quality of the beekeeping products produced by the two companies. Price is an important consideration, but quality can be more important particularly if one is considering equipment which is purchased primarily for safety purposes. Gloves, veils and smokers are all used by beekeepers to reduce their chance(s) of being stung and quality must not be sacrificed for the sake of price. However, the coveralls from the government stores seemed to be of adequate quality and less expensive than imported coveralls for the beekeepers.

Recommendations:

1. Continue the current practice of selling protective beekeeping equipment to interested beekeepers and allow the individuals to repay the loans on an established schedule as the current arrangement. Project personnel are presently screening the individuals who are permitted to purchase the equipment on a loan repayment basis to insure that only committed and capable

individuals are involved and this procedure should be continued.

2. The project has sold approximately 1/2 of the original 500 sets of protective beekeeping equipment. The present success of the project and its anticipated growth suggest that additional sets of equipment will be purchased by the beekeepers. Plans should be made to increase the project's stockpile of protecive equipment with additional purchases being made in the future. Such purchases should be made based on price and quality of specific items. I strongly recommend that the project personnel test some of the smokers, veils and gloves being produced by Zambian firms to evaluate their quality before any orders for new stocks are processed.

3. The interest by the beekeepers in purchasing bicycles will probably continue to grow and plans should be developed for providing this equipment. One primary consideration is determining the market for the bicycles. As demonstrated by the sale of protective beekeeping equipment, the bikes should probably be sold on a loan repayment basis to selected individuals (beekeepers). There was some discussion as to the benefits of selling a bike to a village or a group of villages because the various beekeepers would experience some communal benefit from the bicycles. For example, one individual could use the bike to make a trip to a project center when the honey from the various village beekeepers was ready for pickup. Such a use would be very beneficial, but one person should probably be responsible for the maintenance of th bicycle and the best way to assure responsibility is to sell the bike to one individual. Such an individual could then make his own arrangements for community use of the bicycle. Of course, careful consideration would have to be given as to which individual was selected by the project for a bicycle purchase, especially if the transaction were on a loan repayment basis.

X. Honey Storage and Containers: Container availability, be it in the form of 500g (.5kg) glass jars or 24kg plastic pails or 100kg metal drums, is an ongoing problem. The unavailibility of containers and the cost of appropriate containers presents a real problem to the project's success in that container lack can present a real bottleneck to honey purchases, processing and/or sales.

One obvious problem observed during my evaluation was the availability of the 25kg (20 liters) plastic pails used for honey storage prior to processing. When honey is collected by the project from the village beekeepers, it is in the 25kg plastic pails which are provided by the project. This honey is still in the comb and is stored in the same pails until the honey is processed. The project was originally allocated 450 of these pails even though the project planning document called for an allocation of 1,000 pails. The pails are purchased with funds from the project's revolving fund at a cost of K22 wholesale or K29 retail and the fund does not have any surplus money at this time for the purchase of additional pails. To further complicate matters, approximately 8% of the pails (at least 36) have been lost or damaged beyond repair reducing the available number of containers to 414 or less. Being made of plastic, the pails will break if a full container is dropped and they are also susceptible to damage by rodents who can chew through the containers to reach the stored honey.

The total storage capacity of 414-25kg pails is approximately 11.4 tons of honey. During my July visit to Kaoma there was slightly over 5 tons of honey already in storage awaiting processing and all of it was stored in plastic pails. This means that if every remaining pail was distributed to a beekeeper with honey

for sale, then the project would be limited to receiving an additional 6.4 tons of honey. Of course, such complete efficiency is unlikely under any system and it becomes likely that the availability of pails could easily become a limitation on honey sales by the project. There are three obvious solutions to the bottleneck problem. One solution is to buy more pails but the revolving fund cannot supply adequate funding at the present time. The other two solutions are to provide a different type of storage for unprocessed honey or to speed up the processing of honey which would empty some of the pails and make them available for redistribution to the beekeepers.

The transfer of the unprocessed honey (honey in combs) to larger containers would provide some relief to the storage problem. However, there are some complications to this approach. One immediate problem is the lack of suitable containers at Kaoma. Several containers are available, but the number is very limited. In addition, the larger containers would be difficult to transport over the unpaved roads to many of the villages. However, their use as holding containers for emptying the smaller plastic pails when honey was collected at the villages would aid in immediately re-circulating the plastic pails for additional honey collection by the village beekeepers.

The third and perhaps most obvious solution to the plastic pail limitation problem is to begin processing the honey as soon as it arrives at Kaoma so that the pails may be returned to the beekeepers for additional use. The problem with this solution is two-fold. One is that the "cold" June and July winter in Kaoma slows down the processing of honey (cold honey moves much more slowly than does warm honey) and this is compounded by the tendency of honey to granulate (solidify) in the comb at temperatures in the 40-60 degree F range. A possible solution to this secondary problem is discussed in section II. Beekeeping Factory Facilities at Kaoma. The second half of this problem, and the more immediate complication, is the unavailability of jars and lids for the processed honey.

The Kaoma center had a reasonable supply of honey jars (500 grams) in stock during my stay there, but they did not have suitable lids. It seems that lids and jars in Zambia are made by two different companies. Kapiri Glass Products produces jars but does not produce lids for them. Lids are provided by an importer in Lusaka named International Enclosures, but suitable lids are often out of stock. The project had purchased lids in April of 1986 but they had not arrived during my July visit to Kaoma. The lack of lids meant that the honey could not be processed and placed into jars because honey has a tendency to absorb moisture from the air if it is left uncovered which will lead to fermentation of the honey. In addition, the Kaoma facility had only one 100kg tank for holding processed honey or an equivalent of four pails capacity. The arrival of the honey factory equipment from Mwekera will provide some additional storage capacity for processed honey, but the total amount is unknown to me.

Recommendations:

1. Look into the possibility of providing additional honey storage capacity in the form of containers similar in size to the 25kg pails. This container is a reasonable size for use by the beekeepers in that one man can lift it and it does hold a large amount of honey. Some consideration should be given to substituting a non-rusting metal for the plastic construction. The plastic pails are subject to damage by chewing rodents and also to

breakage due to dropping which limits their effective lifespan. A metal container would eliminate the previously discussed problems but would probably be more expensive. Another consideration is that the metal pails would absorb heat more quickly than the plastic pails and should not be left in direct sunlight when filled with honey because the heat could cause the honey to decompose.

2. Equip the vehicles going to the villages for honey collection with containers capable of holding approximately 60-80kg of honey. The unprocessed honey (honey in the comb) could be transferred from the smaller pails into the larger containers for shipment to Kaoma and the empty pails could be returned to the beekeepers for additional honey collection. The number of such containers that could be used on each trip would be limited by road conditions and accessibiity.

3. Insure that the honey factory at Kaoma has sufficient honey settling and storage tanks. The capability to hold up to one ton of honey is not unrealistic.

4. Coordinate the ordering and shipment of honey jars and lids so that the unavailability of one does not become a limiting factor in honey processing and bottling. The coordination of such orders with those made by the Forestry Department for its Mwekera facility and perhaps the IRDP facility might provide enough clout to guarantee reasonable service and delivery by the jar and lid distributors.

XI. Beeswax: Even though the project is primarily based around honey; nevertheless, beeswax has an excellent potential as an income source for the beekeepers in the project.

The beeswax produced in the project area is of excellent quality. Because of minor chemical differences and differences in bee management, the wax produced by the project is of a higher quality than U. S. wax. The use of bark hives means that beeswax is not reused year after year as would be the case with western frame hives. Thus, the project wax tends to be relatively new, clean wax which hasn't been excessively travel-stained by the bees over the years. In addition, there is a slight chemical difference in the Zambian wax composition because the Zambian bees are somewhat genetically different from western bees. These two factors result in the production of a beeswax which lends itself to efficient chemical bleaching for the removal of impurities and the production of a very clean wax. A clean wax is an essential ingredient in the production of cosmetic products using beeswax as a base.

Some of the beekeepers were selling processed (not chemically bleached) wax to the project during my evaluation trip. That tended to be of excellent quality and much of it was actually clean enough to be entered in competition (honey and wax shows) in the U. S. This processed wax was probably the residue left after the honey was separated for conversion into honey beer (mbote).

The quality and saleability of Zambian wax is demonstrated by the visit of Mr. Ntambo, purchasing agent for Continental Products (Zambia, Ltd.) to some of the project villages. He stated that his company had purchased four and one-half tons of Zambian wax in 1985. Of that total, three tons were used by his company for product development and one and one-half tons were shipped to

other plants in southern Africa. The project price of K4.0-4.5 per kg. for wax seemed to be readily acceptable by Mr. Ntambo.

Recommendations:

1. Emphasize the sale of processed wax to the project by the beekeepers. There is an excellent market for such wax and it requires no additional processing by the project personnel, but it does sell for as much as a 50% mark-up under present market conditions and would contribute greatly to the solvency of the project's revolving fund.

2. Develop realistic plans for the processing of the wax in the comb honey purchased from the village beekeepers. The average ratio of 9 parts honey to 1 part wax in comb honey would result in about 1 ton of wax for every 10 tons of purchased comb honey. Efficient wax processing is discussed in Section II. (Beekeeping Factory Facilities at Kaoma) of this report.

XII. Scheduling and Maximizing Efficient Use of the Project Staff: The efficient utilization of the project staff requires that some consideration be given to scheduling activities so that the time and abilities of the beekeeping project officers and the project beekeepers are optimized. The beekeeping staff is primarily responsible for working with the village beekeepers and this requires that consideration be given to the timing and periodicity of honey flows and other natural phenomenon. The staff must handle project administration, extension work, honey purchase and sales, transportation of products, etc., and the timing of these activities are largely determined by the magnitude and the timing of the natural honey flows.

For example, a late start in honey processing by the project staff could very well result in a backlog of unprocessed honey which would create a limitation in available honey pails for additional honey purchases and the unavailability of honey for retail outlets. One way to approach the efficient utilization of the staff from the beekeeping standpoint is to develop a general time frame for general project staff responsibilities based on the natural honey flows.

Recommendation: Develop project schedules for extension work, honey buying trips, etc. using Table 1. as a general guideline (Table 1. is an enhancement of Table 6. (Chronology of Beekeeping Activities) from the project document, "Proposed Program for Honey and Beeswax Production and Processing in the Western and Central Provinces of the Republic of Zambia".

Time Span	Floral Activity	Bee Activity	Beekeeper Activity	Project Activity
May to Early June	Julbernardia in full flower.	Breeding slows & stored surplus stored.	Start honey cropping in May before cold weather (June) starts Notify project of honey availability.	Begin buying honey as soon notified. Immediately start processing of purchased honey to avoid cold June temperatures.
June	Little flowering.	Little hive activity. Bees relatively gentle.	Notify project of honey availability. Continue cropping.	Continue buying and processing (honey & wax). Colder June temperatures will slow processing.
July	Few Flowers Available.	Little hive activity. Bees relatively gentle.	Notify project of honey and/or wax availability. Begin preparing hives for next honey flow.	Continue buying (if available) honey & wax. Seek out wax left from beer production.
August	Marquesia, Parinari, & Syzygium in bloom. (minor plants)	Bee brooding starts & builds up. Bees become more aggressive.	Continue hive prepara- for honey flow.	Conduct extension training at centers but not at villages unless hon is processed.
Sept. to Early Oct.	Brachystegia begins flowering.	Breeding intensifies. Bees more aggressive.	Continue hive preparation for flow.	Extension work in villages & at centers. Prepare station hives for honey flow.
Oct.-Nov.	Brachystegia in full flower.	Breeding slows. Surplus honey stored.	Begin cropping full hives.	Distribute buckets to beekeepers for honey. Extension work at villages and center(s).
Dec.-Jan.	Few plants in bloom.	Breeding stops and then continues at low levels.	Notify project of of honey availability.	Purchase honey. Begin honey processing to avoid backlog. Seek out wax left from beer production.
Mar.-April	Julbernardia begins flowering.	Rapid buildup. Swarming begins. Bees more aggressive.	Complete cropping if not completed. Prepare hives for next honey crop.	Extension work in villages & center(s). Prepare station hives for honey flow. Distribute buckets to beekeepers for honey in late April.

Table 1. Chronology of Beekeeping Activities

SUMMARY AND OVERALL RECOMMENDATIONS

The Africare beekeeping project in Zambia, "Western Province Small Farmers Production Project (Beekeeping)" is basically a well-managed endeavor which has made good progress in achieving the primary goal of supporting development of village-based production, processing and marketing of honey and beeswax in the country's western and central provinces. In addition, the current project accomplishments indicate that there is excellent potential for futher success.

It is clear that the project is anywhere from 12 to 18 months behind schedule in meeting many of the planned milestones, but there are a number of extenuating factors. The delays in assigning a permanent resident manager to Kaoma and in the completion of the honey processing factory and personnel housing are obvious delays that have caused the slippage of other project milestones. However, those particular problems are no longer restrictions on the continued operation of the project. Mr. Muntholi has been the "resident" manager in Kaoma since May 1985 (actually in-residence) and the project has made great strides since that time. The project has officially recruited 356 new beekeepers and the number should exceed 500 by the end of 1986. More important than the number of beekeepers is the enthusiasm with which the beekeepers support the project. I was favorably impressed by the quality of the honey and wax being sold to the project and by the enthusiasm of the beekeepers. The project seems to be very well received by the project clientele and it appears to fill a real need in providing a method of moving honey and wax from the villages to the towns and cities to the profit of the village beekeepers.

Now that the housing and factory restrictions (completion of construction) are removed, I would recommend that the project be viewed as having reached approximately the end of the first 12 months of its development. The project planning documents predicted a construction completion time of approximately 12 months and the project has just now reached that particular stage of its development. The unavailability of the honey processing factory and adequate housing for project personnel have limited the project's potential until now, but those limitations are now gone.

Based on the current success of the project and its acceptance by the Zambian beekeepers, I would strongly recommend that the project be extended for an additional two years utilizing the original project planning documents as modified by the recommendations made in this report.

Appendix A

Syllabus Used by Forestry Dept. for Beekeeping Course Taught at the Beekeeping Center in Kabompa, Zambia (provided by Mr. Muntholi)

SYLLABUS FOR BEEKEEPING FOR FARMERS

Course:

1. Introduction
2. Beekeeping Areas
3. The Bee Colony
4. The Hive
5. Hive Management
6. Apiary Management
7. Bee Botany
8. Marketing Honey and Beeswax
9. Pests and Diseases
10. Extension Work
11. Forest Law and Policy
12. Beekeeping Practical Work/Demonstrations

SYLLABUS SCHEDULE: THEORY

COURSE: BEEKEEPING FOR FARMERS

Subject Material

1. Introduction

   1.1 Reasons for Beekeeping in Rural Areas

2. Beekeeping Areas

   1.1 Requirements for Beekeeping

3. The Bee Colony

   3.1 Reasons for understanding bee behavior

   3.2 Different kinds of bees and their duties

   3.3 Stages in the life cycle of the colony

   3.4 Beekeeping Time-table

4. The Hive

   4.1 Non-frame hives

   4.2 Points to note about bark hives

5. Hive Management

   5.1 Distribution and hanging

   5.2 Baiting and occupation

   5.3 Apiary

   5.4 Absconding

   5.5 Bark hive management

   5.6 Records of Apiary data

6. Apiary Management

   6.1 Cropping

   6.2 Equipment used when cropping bark hives

   6.3 Honey hunting

   6.4 Wax and Honey - storage

   6.5 Records of results

7. Bee Botany

   7.1 Upland Forests

   7.2 Miombo Woodland

   7.3 Cultivated plants

   7.4 Fruit trees

   7.5 Weeds, grasses and herbs

8. Marketing Honey and Beeswax

   8.1 Preparation of honey and beeswax

   8.2 Increasing District production

   8.3 Stimulating market interest

9. Pests and Diseases

   9.1 Honey badger

   9.2 Red Ants

   9.3 Bush Babies

   9.4 Hive Beetles

   9.5 Bee diseases and Control

   9.6 Fires

10. Extension Work

    10.1 Extension as education

    10.2 Adult teaching/learning

    10.3 Extension teaching methods and aids.

11. Forest Law and Policy

    11.1 Restrictions in National and Local Forests

12. Beekeeping Practical Work

    12.1 Construction of Bark Hives

12.2 Making of Bark Hive Accessories

12.3 Demonstration on honey cropping, processing and storage

12.4 Demonstration on Beeswax preparation, processing and storage

Appendix B

TITLE: A proposal to provide relevant training in beekeeping to members of the Zambian Forestry Department's Beekeeping Officers and to other interested personnel.

PREPARED BY: Dr. John T. Ambrose, Apiculturist, NC State University, U.S.

JUSTIFICATION: At the present time the Zambian Forestry Dept., Africare and the IRDP (Integral Rural Development Project) are all involved in promoting beekeeping in Zambia. The basic goal of all the participants is to increase earnings of the nation's beekeepers and potential beekeepers. An integral key to the success of that goal is to provide relevant training (extension work) to the beekeepers.

The Forestry Dept. currently has approximately 30 officers in its Beekeeping Division and these are the personnel who must provide the extension training. Unfortunately, only a few key persons in the beekeeping division have themselves received suitable training in beekeeping. All of the officers have completed the two-year certificate program at the forestry school in Mwekera, but that program includes only an introduction to beekeeping. Following is a listing of the Beekeeping Division officers who have completed some comprehensive training in beekeeping or who have completed a B.Sc. program:

Two-Year Beekeeping Diploma Program in Tanzania
Mr. Zulu, Chief Beekeeping Officer (CBO)
Mr. Masialeti, stationed at Chati.
Mr. Fwoloshi, stationed at Solwezi

One-Year Beekeeping Diploma Program in U.K.
Mr. Kimbau, stationed at Solwezi
Mr. Zimba, stationed at Kombompo
Mr. Chupa, stationed at Mwekera

Higher Degree Programs
B.Sc. from Tanzania*
Mr. Muntholi, Africare Project Manager
Mr. Njovu, acting deputy to CBO
*does not include any in-depth beekeeping training

M.S. from United States
Mr. Phiri (specialization in apiculture/beekeeping)
(will return to Zambia in 1987)

At the present time, Mr. Zulu only has five beekeeping officers who have received relevant beekeeping training. The number will increase to six when Mr. Phiri returns from the U.S. in 1987, but that gain will be offset by Mr. Zulu's planned retirement three years from now. Two additional officers have completed

B.Sc. programs, but those programs did not include any significant work in beekeeping. Thus, at the present time, only 17% (5 out of 30) of Mr. Zulu's officers have any formal beekeeping background and none of the officers assigned to the Africare project meet that criteria.

The training (extension work) presently being provided by the Africare personnel seems to be appropriate based on the needs of the village beekeeper and the training of the beekeeping officers. However, this situation will worsen shortly if the project hopes to improve the beekeeping efficiency of the project clientele. The technology of bark hive beekeeping in Zambia can be improved but only if the beekeeping officers first receive appropriate training. In addition, there is also some potential to move some beekeepers to more advanced hives including the Kenya and the Langstroth (frame) hive.

PROPOSAL: To provide an in-country course of training in basic and applied beekeeping technology to the beekeeping officers of the Zambian Forest Dept. and other interested personnel.

Time-Frame: A training session of 12-16 weeks duration based around a major honey flow. The two applicable periods would be March-June or Sept.-Dec.

Suggested Participants: Primary candidates would be the Forest Dept. officers assigned to the beekeeping division and new forestry officers completing the Forestry School's two-year program at Mwekera. Also to be considered would be forestry officers with an interest in beekeeping. Secondary candidates would be personnel from agencies doing work in Africa (i.e., Peace Corps., PVO's, etc.) who are or will be doing beekeeping work.

Class Size: 15-20 students

Note: I would recommend that all of the forestry officers assigned to the Africare project attend the training program. In addition, I would recommend that as many as possible of all of the Forest Department's beekeeping officers attend the course. Undoubtedly, this would create some short term problems, but the long range advantages of such training should outweight any temporary disruption in the Forest Dept.'s operations. The cost of multiple training sessions for small groups of officers would probably be prohibitive.

Site: Forestry School at Mwekera with access to both bark and frame hive apiaries.

Syllabus: The training program will be a combination of classroom instruction and related practical "hands-on" work with the bees, equipment and/or bee products. In addition, the training will deal with both the technical training of the students as well as instructing the student in extension techniques so that they can transfer the learned material.

Technical Training Subject Matter:

Honey bee biology
Honey bee behavior
Bark hive beekeeping
    hive construction and maintenance
    modification of hive for increased production
    hive management (seasonal & long-term)
    honey & wax cropping and processing
Frame hive beekeeping
    (sub-topics similar to bark hive beekeeping)
Comparisons of bark hives and frame hives and introduction to intermediate hives such as the Kenya hive
Products of the hive
    honey, beeswax, pollen, propolis
Apiary site selection
Bee diseases and pests
Bee plants (food sources): forest & agricultural
Bee pollination of agricultural crops
    (i.e., sunflowers, citrus, etc.)
Product handling & marketing

Extension Training

- Classroom Presentations
    material preparation
    material presentation
    student (participants) selection

- On-site Practical Demonstrations & Lectures
    timing of visit
    material preparation
    effectiveness of combining lecture & "hands-on" demonstrations

- Formal "hands-on" Teaching Methods
    i.e., work in demonstration apiaries
    processing facilities, etc.

- Topic Selection
    material & equipment preparation including either dry-run or previous experiences
    participant selection
    management of actual training

INSTRUCTOR: Qualifications: An individual with extensive training in apiculture including both formal and practical experience. The individual should be knowledgeable in various types of beekeeping from bark hive beekeeping through the "modern" frame hive technology. Some experience in teaching and/or extension work would be advantageous.

Appendix C

Suggested Apicultural (Beekeeping) Reference Materials for the Africare Beekeeping Project Office at Kaoma, Zambia.

Books:

1. Hive and the Honey Bee by Dadant and Sons (approx. price $15.00)
2. ABC & XYZ of Beekeeping by A. I. Root (approx. price $14.00)
3. Honey by Eva Crane (approx. price $40.00)
4. Honey Bee, Pests, Predators and Diseases, edited by Roger Morse (approx. price $45.00)
5. Honey Bee Brood Diseases by Henrik Hansen (approx. price $10.00)
6. Contemporary Queen Rearing by Harry Laidlaw (approx. price $11.00)
7. Beeswax, Production, Harvesting, Processing & Product by Morse & Cogshell (approx. price $15.00)
8. Beekeeping in Zambia by Roger Silberrad (approx. price $14.00)
9. Beekeeping in South Africa by R. H. Anderson (approx. price $15.00)
10. Encyclopedia of Beekeeping by Roger Morse and Ted Hooper (approx. price $34.00)

Journals and Periodicals:

1. American Bee Journal, published monthly by Dadant & Sons (approx. price $30/yr.) including postage
2. Gleanings in Bee Culture, published monthly by A. I. Root, Co. (approx. price $30/yr.) including postage
3. Membership in International Bee Research Association, headquartered in Cardiff, U. K., (membership is approx. $140/yr. and includes subscriptions to three beekeeping journals (Bee World, Journal of Apiculture Research, & Apicultural Abstracts), published on a quarterly basis.

NOTE: I would recommend that books #1, 3, 8 & 10 be provided for the project offices at Mumbwa, Lukulu and Mayukwayukwa.

SECTION II: Administration and Finance

Alvin D. Blake

EXECUTIVE SUMMARY

This preliminary evaluation looks at the performance of the Western and Central Provinces Beekeeping Division project supported by Africare. The evaluation is intended to serve two purposes. Where possible, it provides a sharp focus on the most recent trends in project objectives and performance, highlighting the incremental nature of changes in the projects approach to impacting small farmer incomes. Second, it permits an examination of the trends of performance over 26 months, covering project implementation, constraints, accomplishments, and potential for long-term income generation.

On the basis of information available at the time of evaluation, nearly 66% of total projects funds, representing around 87% of non-U.S. Government contributions and 59% of U.S. Government contributions were utilized to assist in achieving project objectives. 1/

Given the variety of prohibitive factors surrounding the full implementation of this project, the overall outcome is still encouraging. There is, however, a clear cause for concern in the continuing need for time and some institutional development.

1/ (a) Months - 26/30 = .866
(b) Disbursements - $283,000 and appropriations - $482,283
$283,000/482,283 * 100 = 59%
(c) Non - U.S. contributions - $167,895; $167,895 * .866 = $145,397
283,000
$428,397

$428.397/$650,180 * 100 = 66%

Climatic conditions, logistical support, scarcity of materials are just a few factors that underline the overall increasing trend toward unfavorable results - especially during 1984 and 1985. Project performance in 1986, so far, show more satisfactory results with honey and beeswax purchases and sales.

The potential for increased honey production from established beekeepers to the project seems good. Though the annual marketed production has not increased to projected levels, still honey production will approach 46,656 kgs for the periods 1984 through 1986. That is nearly 42% of the projected level. As a result, incremental income per capita for small farmers is expected to rise nearly 85%; while nominal per capita income will rise nearly 25% over the 1982 level. Beekeeping groups grew nearly 47% over the same period, while the number of beekeepers rose approximately 5.8%.

In general, market factors have not constrained output to the same extent of delays in plant construction. As to prices, local authorities have attempted to strike a balance between prices for producers and those for consumers through the use of "floor prices" for honey and beeswax.

Finally, Africare appears to have approached the shortages of management and technical skills not as basic lack of competence or ability but as part of the evolutionary process of development in which training and experience lead to the emergence of the required skilled personnel within the local environment. Management training for the project manager and training in basic accounting for the project account are paramount to

the success of the project. Just as important, in assessing the sustainability of the this project, is Africares continued association with the Beekeeping Division after the plant is completed and until all initial problems have been worked out.

Introduction

Zambia's stated economic objectives are to increase investments in the productive sectors of the economy; to diversify the economy away from dependence on mining toward more emphasis on agriculture and domestic resource based manufacturing; to reduce disparity between urban and rural living standards; to achieve self-sufficiency in food production; and to provide more job opportunities through the development of small scale industries and labor intensive technologies.

In keeping with Zambia's rural development objectives, Africare has agreed to support the Forestry Departments Beekeeping Division implementation of a program to improve the development of village based production, processing, and marketing of honey and beeswax in the Western and Central Provinces.

The Beekeeping Divisions basic objectives are to promote economic development, specifically improving incomes of rural honey producers - through honey and beeswax production - while simultaneously strengthening conservation of Zambia's dwindling forests, essentially through extension and training activities.

Africare has assisted the Forestry Department to establish a buying /processing /selling intermediary to help provide a more reliable market for the principle beneficiaries - subsistence farmers in the Kaoma, Lukulu, and Mumbwa Districts.

In addition, the two-and-one-half-year project has provided up to K90,000 to the Forestry Department to establish a revolving fund to purchase honey and beeswax, make loans for equipment purchases to bee-keepers , and to recover recurrent expenditures until the program becomes self-sustaining (note that self-sustainment is dependent upon several factors including cost minimization - overhead, production levels, inventory control, and marketing).

An important aspect of this evaluation is to relate past experience to present efforts - where possible. In summarizing the experience with the Division, it seeks to measure the level of achievement or failure, and point to recurring patterns in the process of project implementation which might have contributed to that achievement or failure, and have implications for the future of the project and its beneficiaries.

The primary emphasis of this evaluation addresses project effectiveness: economic, financial, social, and institutional. 2/ Process efficiency is also examined bearing in mind two separate considerations: (i) project design and implementation are central to its success and a major failure in any aspect of the process can seriously erode the project objectives (food production and income generation);

2/ Note that many quantitative measurements were not available, qualitative assessment of the projects performance is made against the originally set objectives.

(ii) important elements of the process and of project design -- the original rate of return projections (was not computed), institutional objectives, schedules of implementation -- are often marked by over - optimism, keeping in mind that a project outcome that falls short of expectations may still turn out to be a worthwhile operation (witness other agriculture and rural developments, i.e. benefit-cost analysis).

This evaluation seeks to be sensitive both to the nature of the project benefits and their beneficiaries, reflecting on food and beeswax production and income generation.

OVERALL RESULTS

This section reviews the overall outcome of the Beekeeping project as it presented it self at the time of evaluation, and attempts to establish the extent to which investments by Africare are worthwhile.

Objectives and Approach

The basic purpose of the "Division" is to strengthen honey and beeswax production capacities, to increase small farmer incomes in Kaoma, Lukulu, Mumbwa Districts in Zambia.

Subsidiary objectives are to develop human resources, establish a market structure, establish a regional processing plant for honey and beeswax, and improve extension services in the area. To safeguard the attainment of these objectives Africare provided technical assistance (Paterson Report, Tom Mollen, Andrew Mack, Grote Report, Moore Analysis, Monde Reports) and endeavor to strengthen Divisional institutional capabilities.

Implementation Experience

Completion Delays

Concurrent reasons for completion delays in constructing the processing plant stemmed from problems in execution of work, procurement, and administrative constraints. To date the processing plant is scheduled for completion by August 30, 1986.

That is , 20 months over due. The 302 house in Lukulu is at roof level. The 315 house in Kaoma is scheduled for completion in early September as well.

The magnitude of average completion delays suggests that original time schedules were too unrealistic. Especially the timing schedule for the project - 2 1/2 years (witness other similar projects of the same scale).

Project Effectiveness and Achievements

The Beekeeping Division succeeded in increasing subsistence farmer incomes , increasing production of honey and beeswax, creating employment, developing human resources, and strenghtening the infrastructure. The question is to what degree? Its impact on production, income, and employment is positive though its magnitude may be highly questionable and difficult to measure. See Tables 2 and 3.

(A) Physical Output and Capacities

Data on honey and beeswax production is available but limited and suspect. At this stage of the project, incremental honey production is approximately 35,429 kgs, 64% of the Year 1 projection; 54.6% of the Year 2 projection; and 45.8% of the Year 3 projection. Current beeswax output is only 8% of the Year 3 projection. See Table 1.

(B) Project Beneficiaries and Target Groups

The Beekeeping Project is linked to beneficiaries through the direct provision of credit, productive inputs such as the revolving fund, training, equipment, supplies and tools, housing.

The largest group of beneficiaries are the small farmers in the Kaoma District. They constitute about 65% of all project beekeepers. Lukulu and Mumbwa represent about 17% each. In terms of farm families, its more like 480 and an estimated 3800 people for all districts.

Since early 1986, nearly 32 new beekeepers have been recruited. Some 10 villages at the West Five in Lukulu; 7 villages at Sitaka in Kaoma; and 5 villages at Chilombo in Kaoma.

(C) Employment and Income

Information on employment and income effects are limited, due in part to difficulties in estimating incremental income prior to full development of the Beekeeping project and the diversity and dispersion of beneficiaries.

Comparisons of income data for the 22 beekeeping groups suggest considerable variation. The estimated real income increases per farmer could range from 10% to 89%, but the average increase approximated 41%. See Table 3.

(D) Economic Returns

For the Western and Central Province Beekeeping Project, historically, financial and economic returns were not estimated. An internal rate of return could have been used as a summary indicator of this project's overall economic merit. In cases like this, where the value of the project lies in creating opportunities for economic activity, the estimation of benefits is less direct.

Since the price of honey and beeswax is subject to control by the government and there is no other available measure of its economic value, the economic worth of the the products is difficult to determine. Therefore, financial revenues can be use as a minimum measure of benefits. Benefits cannot be easily compared with costs at this point; this project's merit must be judged qualitatively in relation to project objectives.

The Africare/Beekeeping Project, despite its efforts to expand beeswax production, has been some what successful in promoting the formation of beekeeper groups. See Table 3.

(E) Impact on Institutional Development

Institutional development objectives of the Beekeeping project are focussed on improvements in management effectiveness. Africare has sought to strenghten and develop market structures and improve accounting procedures.

The build-up of technical capacity which must accompany the implementation and operation of the Kaoma processing plant is critical if the Division intends to improve capacity utilization and resource efficiency.

Table 1

Estimated Annual Honey/Beeswax Production and Income Among Active Beekeepers in Project Area *

District/ Beekeepers	May/June 1986 Current Prod/ Income [1]				Nov/Dec 1986 Project Prod/ Income [2]				Total Income Projected Income Kwacha
	Honey (kg)	Value (kw)	B-wax (kg)	Value (kw)	Honey (kg)	Value (kw)	B-wax (kg)	Value (kw)	
Kaoma /250	8,500	28,305	162	729	10,000	33,300	300	1,350	63,684
Lukulu/ 120	1,300	4,329	51	230	5,000	16,650	230	1,035	22,244
Mumbwa/ 106	@	@	@	@	@	@	150	675	675
Total	9,800	32,634	213	959	15,000	49,950	680	3,060	86,603

* All honey is assumed to be sold at a weighted official price of K3.33/kg and beeswax at K4.50/kg. Based on a moderate average honey flow of 6 kg per hive, 100 per beekeeper and 40% occupancy rate. Note that nearly 9,000 kg was not purchased due to Division liquidity problems.

[1] Current figures reflect July 31,1986 inventory valuation. That is, 6,283 kg of honey with a market value of K22,785 and 213 kg of beeswax valued at K958.5.

[2] Projected production figures reflect estimates determined by the project manager. The market value for the projections reflect a 60:30:10 split between ungraded, bottled, and graded honey sales, respectively.

@ less than 21 kg.

Table 2

Annual Beekeeping Division Income in Kwacha on Honey /Beeswax Sales *

Project Year	Honey/kg Purchased	Honey/kg Processed	Income Kw/kg 1	Beeswax Purchased	Beeswax Income 2	Total Income	Total Cost	Net Income
1984	6,177	4,324	12,022	536	1,957	13,979	25,362 3	(11,383)
1985	5,050	3,535	9,827	568.4	2,075	11,902	25,702 4	(13,800)
1986	35,429	24,800	82,584	893	4,018.5	86,603	41,546 5	45,057

* Using 70% recovery rate.

1/ 1984 and 1985 weighted market price is K2.78; 1986 weighted market price is K3.33.

2/ Beeswax market price in 1984 and 1985 was K3.65; for 1986, it is K4.50.

3/ Less government reimbursement expense. See Grote report.

4/ Less government reimbursement expense. See Grote and Moore Reports.

5/ Based upon actual expenses recorded in Division financial statements of January 1986 through June 1986; July through December costs are estimated.

Table 3.a - Incremental Analysis - Percent Change

Year	Beekeepers (#)	% Change	Beekeeper Groups	% Change	Honey (kg) Purchases	% Change
1984	450	--	15	--	6,177	--
		0		0		-19.3
1985	450	--	0	--	5,050	--
		5.8		46.6		601
1986	476	--	22	--	35,429	--

Note that honey purchases between 1984 and 1986increased 473%.

Table 3.b

Year	Honey producer prices	% Change	Base Per Capita Income (kw)	% Change	Incremental Per Capita Income	% Chg.
1984	.70	--	60	--	13.7	--
		42.8		0		-3.4
1985	1.00	--	60	--	11.2	--
		50		0		89
1986	1.50	--	60	--	74.4	--

Farm gate price increased 114% between 1984 and 1986. Prices and income in Kwacha.

Table 4

BREAK - EVEN POINT ANALYSIS *
(All monetary amounts expressed in current Kwacha)

	Breakdown of expenses in %		Breakdown of expenses in kwacha terms		
	Fixed	Variable	Fixed	Variable	Total
Honey/beeswax Purchases	100	50	34,224	34,224	68,448
Vehicle Depreciation	83.4	-	14,250	-	14,250
Vehicle Maintenance	100	16.6	5,000	2,500	7,500
Vehicle Operations	100	-	30,000	-	30,000
Driver	100	-	2,400	-	2,400
Night Allowance	100	-	2,500	-	2,500
Extension Officer Salaries	100	-	12,428	-	12,428
Labor	100	-	12,000	-	12,000
Processing plant depreciation	100	-	3,250	-	3,250
Building maintenance	100	-	1,625	-	1,625
Equipment depreciation	100	-	3,600	-	3,600
Equipment maintenance	100	-	1,500	-	1,500
Utilities	100	-	3,000	-	3,000
Packaging	50	50	16,000	16,458	32,458
Training	75	25	900	310	1,200
Travel Allowance	100	-	2,496	-	2,496
Honey containers	50	50	2,000	2,000	4,000
Total			K147,173	K55,482	K202,655

Variable cost per ton	= K55,482 / 77
	= K720.55
Profit Break-even Point	= K147,173 / (3450 - 720.55)
	= K147,173 / 2729.45
	= 53.92 tons
Profit Break-even Point (% of capacity)	= 53.92 / 200 = 27% of capacity

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* The breakeven point has been calculated on the basis of costs expressed in current terms, in the year 1988 - when the plant reaches steady state operations of 77.28 tons or 77,280 kgs with a total nomial capacity at 200 tons or 200,000 kgs and a weighted price of honey and beeswax in current terms at K3.45.

Note that the weighted average scale price of honey and beeswax is based on a 60:30:10 split between ungraded, bottleed, and graded honey sales including a 9:1 split between honey and beeswax.

SUMMARY FINDINGS

A government freeze on hiring in Zambia will limit the Divisions ability to process honey, especially during the heavy flows.

Honey buying and beeswax purchases are carried out over a three month period instead of two months - extending the time lag between cropping and selling.

Processing honey manually slows the operation. The processing plant at present is not in operation...at least not until September 1986. Processing is currently affected by the lack of lids and storage space for the honey.

Marketing the honey may not be a major problem now because of the the level of processing. However, as the processing plant becomes operational and reaches its 'steady state capacity' a solid market analysis (emphasizing market penetration) will become critical.

The velocity of honey sales has been crucial to the revolving funds liquidity...ultimately impacting honey and beeswax purchases and income generation.

Since the farm gate price and market price of honey are fixed, market forces have had little to no effect on price. Cost, however, can be controlled by the Division through effective management.

Money on numerous occasions has been insufficient to purchase honey and buckets. Buckets (containers) are more costly now; their prices are up 83% at the factory; and 141% in the local shops.

Balance sheet preparation and inventory control and valuation have been mixed. These are key measures of project liquidity and profitability.

Mumbwa is in need of an office block for storage of honey and beeswax.

Mayukwayukwa Beekeeping Officer is not properly housed . This is the most active honey cropping group.

Extension activities are severly limited because of the existing availability of transport facilities for extension workers.

Because of the devaluation - the kwacha - cost savings have resulted for various project expenses. Some savings are a result of overestimated cost as well- a necessary precaution to hedge against inflation. Usually, most projects experience cost overruns.

Savings for all construction in kwacha is well over 150%. Using K6.5 = $1.

No attempt has been made to repay the Africare loan - for the establishment of the revolving fund. The revolving fund has experienced flow problems since its inception. Actual funds to purchase honey and beeswax constituted less than 40% of the original loan.

Beekeepers are repaying their loans promptly, that is, no account has been in arrears for either for equipment or bicycles.

Hives per beekeeper has increased 85% over the original number. The average number of hives per beekeeper is between 85 and 100, to date.

Less beeswax will be available for sale to the Division if commercial wax supply continues to decline and its price rises.

RECOMMENDATIONS

Improve technical capacity through management training for the Project Manager and training in basic accounting for the Project Accountant.

Follow-up, vigorously, work to be completed on the 302 house in Lukulu.

The Beekeeping Division should set aside 20% of every kwacha in a separate account to repay Africare.

A thorough market analysis is a 'must' if this project expects to become self-sustaining. Survey, target, and penetrate all possible markets. Utilize informative and persausive advertizing.

Motor bikes would significantly improve the scope of extension coverage and expand recruitment, training, and food production.

Inventory should be taken on a quarterly basis to correspond with inventory build-up of honey and beeswax.

Conduct a cost analysis of the operation once the plant in Kaoma is operating near steady state capacity.

The project implementation period should be extended at least two additional years...to take advantage of the investments already made.

Training of trainers should should be implemented and monitored at the village level.

Re-examine the quantitative and qualitative aspects of the projects after one full year of operation.

SECTION III: Evaluators' Resumes

JOHN T. AMBROSE

ACADEMIC RANK
Associate Professor of Entomology
Full Member Graduate FAculty

BIRTHDATE/PLACE
August 28, 1944
New York, NY

DISTRIBUTION OF EFFORT
55% Extension 30% Research 15% Academic Affairs

SPECIALIZATION AND AREAS OF INTEREST
Extension: Working with the beekeeping industry at the hobby and commercial level; dealing with everything from bee management to marketing of the honey crop.
Research: Pollination studies of apples, cucumbers and blueberries using honey bees and a solitary bee, the blue orchard bee; behavioral work on honey bee learning and the swarming process in honey bees are also underway as are honey bee disease and pest studies.
Teaching: ENT 203 An Introduction to the Honey Bee and Beekeeping (offered each fall).
ENT 690B Social Behavior of Insects (Seminar)(offered every 2-3 yrs.)
B. S. 495 R Beekeeping Laboratory (Special Topics) (offered S-1986)

EDUCATION
B. A. - George Mason College (Univ. VA), 1968. Zoology
M. S. - Cornell University, 1973. Entomology
Ph.D. - Cornell University, 1975. Entomology

PROFESSIONAL EXPERIENCE
1966-68 Lab Assistant, University of Virginia
1971-73 Research Graduate Assistant, Cornell
1973-75 Research and Teaching Graduate Asst., Cornell
1975-80 Assistant Professor, Department of Entomology, NCSU
1980- Associate Professor, Department of Entomology, NCSU

PROFESSIONAL SOCIETIES
International Bee Research Association (Convenor for southeastern US)
International Commission for Bee Biology
Sigma Xi
Entomological Society of America
Eastern Apicultural Society (Director, 1978-82)
North Carolina State Beekeepers Association (Executive Secretary 1976-present)
Southern States Beekeepers Federation (Secretary-Treasurer, 1981, present)
American Association of Professional Apiculturists
American Beekeepers Federation (Director from NC, 1982-present)
N. C. Association of Cooperative Extension Specialists
N. C. Entomological Society

HONORS, AWARDS, CONSULTANTSHIPS, ADVISORY PANELS

1981-present Consultant to Near East Foundation on establishing a modern beekeeping industry in the Sudan (included 6-week stay in the Sudan in 1981, a 3-week visit in 1984, and a 3 week visit in 1985.

1984- Recipient of the "Beekeeping Industry Award" from the Southern States Beekeepers Federation.

1984- Recipient of the N. C. State Beekeepers Associations "Distinguished Service Award"

1984-Requested by Senator Helms to provide testimony to his U.S. Senate Agricultural Committee on the merits of the "Honey Board Bill" which was subsequently enacted into law in the 1984 session.

1985-Requested by Senator Helms to provide testimony to his U. S. Senate Agriculture Commitee on the continuation of the honey loan portion of the 1985 Farm Bill.

1985-Recipient of the NCSU "Outstanding Extension Service Award"

NCSU COMMITTEES (last 6 years)

Department

University Day Committee (chairman)
Seminar Committee
Lecture Series Committee
Curriculum Committee
Ad Hoc Graduate Program and Curriculum Committee

University

NCAES Vegetable and Tree Fruits Coordinating Committees
Collegiate Academy Lecture Program
NCSU Merit Scholarship Award Program
NCSU representative on two graduate student (Ph.D) committees

GRANTS AND MEMOS OF AGREEMENT RECEIVED (last 6 years)

(Source, Amount, Dates, Title of Grant)

N.C. Agric. Foundations, Inc.	3,750	1982 (film on N.C. Beekeeping Ind.)
N.C. Apple Growers Assoc.	3,000	1983 (apple pollination research)
Apiculture Science Fund of the NC State Beekeepers Assoc.	34,000	76-85(graduate student support)
N. C. Agricultural Foundation	4,000	1985 Produce film on N. C. beekeeping

GRADUATE STUDENT ADVISEMENT (last 6 years)

Total Career Graduate Student Committees 10 Chairman or Co-Chmn. 7 MS 3 PhD

Last 6 years Chairman or Co-chairman

Name	Degree	Date	Current Occupation
Robacker, David C.	Ph.D.	1979	Postdoc, USDA
Stringham, Stephen M.	M. A.	1979	Ext. Specialist, MO
Lord, William G.	M. S.	1980	Technician, NCSU
Romanow, Louise A.	M. S.	1980	PhD Grad. Student
Garcia, Lloyd E.	M. S.	1981	State Bee Inspector, NCDA
Metcalf, Jeanette S.	M. S.	1981	IPM Technician, Wisconsin
Kuhn, Eric D.	Ph.D.	1982	Ext. Specialist, Cornell
Schillaci, Paul A.	M. A.	1982	Technician, NCSU
Nalepa, Christine A.	Ph.D.	1986	student
Phiri, Lyson	M. S.	1986	student

PAPERS PRESENTED AT MEETINGS (last 6 years)

Ambrose, J. T. and C. M. Mainland. 1978. Rabbiteye blueberry (Vaccinium ashei) pollination tests. Proc. Fourth Int. Symp. on Pollination, Colelge Park, MD

Ambrose, J. T. and O. T. Sanders. 1978. Magnitude of black bear depredation on apiaries in North Carolina. Proc. of Fourth Eastern Black Bear Workshop, Greenville, Maine.

Ambrose, J. T. 1979. Bees, bears and other critters. Southeast Reg. Bee School, Knoxville, TN.

Ambrose, J. T. 1980. Building a successful beekeeping organization. Bee Inspectors Annual Workshop, Beltsville, MD.

Ambrose, J. T. 1982. Pollen Trapping. Pollen Collection Workshop, Clemson, SC

Ambrose, J. T. 1982. Thinking like a bee. Tri-State Beekeepers Workshop. Corvallis, Oregon.

Ambrose, J. T. 1984. The value of understanding honey bee behavior in managing the insect. Insect Symposium at University of Khartoum; Khartoum, Sudan.

Ambrose, J. T. 1984. Bear Depredation of Beehives in the U. S. Pennsylvania State Beekeepers Meeting and Workshop, New Staunton, PA.

Ambrose, J. T. 1985. Langstroth: his life and times. Eastern Apiculture Society Meeting, Lancaster, PA

PUBLICATIONS

Total Career Books/Chapters 1/2 Refereed Articles 25 Extension 22 Other 34

Books/Chapters

Ambrose, J. T. 1978 Aves (Brids) in Honey Bee Pests, Predators and Diseases. Cornell Univ. Press, Ithaca, NY pp. 215-227.

Burgett, D. M., D. M. Caron and J. T. Ambrose. 1978. Urban apiculture in Perspectives in Urban Entomology. Academic Press, NY pp. 187-220.

Ambrose, J. T., and H. Shimanuki. 1986. Beekeepers Handbook. Wiley & Sons, NY, NY

Refereed Articles

Fell, R. D., J. T. Ambrose, D. M. Burgett, D. DeJong, R. A. Morse and T. D. Seeley. 1977. A seasonal cycle of swarming in honeybees. Jour. of Apic. Res. 16: 170-173.

Robacker, D. C., and J. T. Ambrose. 1978. Random partial reinformcement in the honey bee (Apidae:Hymenoptera): effect on asymptotic performance and resistance to extinction. Jour of Apic. Res. 17:194-200

Ambrose, J. T., R. A. Morse and R. Boch. 1979. Queen discrimination by honey bee swarms. Ann. Entomol. Soc. Am. 72:673-675.

Robacker, D. C., and J. T. Ambrose. 1979. Effects of number of reinforcements and interference of visual and olfactory learning modalities of the honey bee (Hymenoptera: Apidae). Ann. Entomol. Soc. Am. 72:775-780.

Bambara, S. B., and J. T. Ambrose. 1981. Three parasites of the greater was moth, 'Galleria mellonella L.' observed in North Carolina. Amer. Bee J. 121:104-105.

Refereed Articles (continued)

Lord, W. G., and J. T. Ambrose. 1981. Black bear depredaton of beehives in North Carolina. 1977-79. Am. Bee J. 121:421-423.

Lord, W. G., and J. T. Ambrose. 1981. Bear depredation of beehives in the United States and Canada. Amer. Bee J. 121:811-815.

Robacker, D. C., and J. T. Ambrose. 1981. Effects of partial reinforcement on recruiting behaviour in honeybees foraging near the hive. Jour. of Apic. Res. 20:19-22.

Romanow, L. R., and J. T. Ambrose. 1981. Effects of solid rocket fuel exhaust on honey bee colonies. Env. Entomol. 10:812-816.

Kuhn, E. D., and J. T. Ambrose. 1982. Foraging behavior of honey bees on "Golden Delicious: and "Delicious" apple. J. Amer. Soc. Hort. Sci. 107:391-395.

Kuhn, E. D., J. T. Ambrose and C. R. Unrath. 1982. A measurement technique for 'delicious apple' shape. Hort. Sci.

Kuhn, E. D., and J. T. Ambrose. 1983. Foraging behavior of honeybees on 'golden delicious' apple. J. Apic. Res. 22:91-93.

Ambrose, J. T. 1983. Honey bee pollination as an aspect of effective apple orchard management practices. In N. C. Agric. Res. Serv. Bulletin #275 Integrated Pest and Orchard Management Systems for Apples in NC p.147-151.

Kuhn, E. D., and J. T. Ambrose. Pollination of 'delicious' apple by Megachilid bees of the genus Osmia. J. Kan. Entomol. Soc. 57:169-180.

Lord, W. G. and J. T. Ambrose. 1985. Topographical and vegetational variation and bear depredation on beehives in North Carolina. Amer. Bee J. 105: 701-702.

Lord, W. G., Bambara, S. B. and J. T. Ambrose. 1985. Effect of bee calm® device on honey bee aggressiveness. American Bee Journal 125:251-253.

Extension Publications and Bulletins

Ambrose, J. T., 1977. Apple pollination. NCAES Beekeeping Note #7A. 3 pp.

Ambrose, J. T., 1977. Making Mead or honey wine. NCAES Beekeeping Note #5,4p.

Ambrose, J. T., and W. C. Lord. 1977. Beeswax. NCAES Beekeepers Note #11, 6 pp.

Ambrose, J. T., and W. G. Lord. 1978. An herb garden for the bees. NCAES Beekeeping Note #2A. 3 pp.

Ambrose, J. T., 1979. Pesticides and honey bees. NCAES Beekeeping Note #11. 4 pp.

Ambrose, J. T., 1979 Directory of beekeepers providing pollination services. NCAES Beekeeping Note #8, 3 pp.

Ambrose, J. T., 1979. Bees and beekeeping in N. C. Bulletin for 1979 N. C. State Fair, 3 pp.

c. Extension Publications and Bulletins (continued)

Ambrose, J. T., 1981. Diseases of the Honey Bee. NCAES Beekeeping Note #3. 7 pp.

Ambrose, J. T., 1982. Beekeeping and Audiovisual Materials. NCAES Beekeeping Note #4. 4 pp.

Ambrose, J. T., 1982. Honey plants of North Carolina. NCAES Beekeeping Note #2, 2 pp.

Ambrose, J. T., 1982. Beeswax. NCAES Beekeeping Note #6 Revised. 3 pp.

Ambrose, J. T., 1985. African "killer" bees. NCAES Beekeeping Note # 10 Revised. 2 pp.

Ambrose, J. T., 1981-84. The following videotapes were produced for distribution through the NCAES:

1. Extracting and Packaging Honey (10 min.)
2. Hiving a Swarm (6 min.)
3. Removing (Robbing) Honey from the Beehive (10 min.)
4. Winter Feeding of the Honey Bee Colony (9 min.)
5. Cucumber Pollination (6 min.)
6. Bee Stings (5 min.)
7. Wasps (6 min.)
8. Bee Beard (6 min.)
9. Setting up a Hive (6 min.)

Ambrose, J. T., 1979-1985. Nectar Guides - quarterly beekeeping newsletter (circulation 4,200)

Other

Ambrose, J. T., 1977. Interpreting weight changes for improved hive management. Dalen Products, Inc., Knoxville, TN 12 pp.

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ALVIN DOUGLAS BLAKE

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OBJECTIVE

Position as Program Management Evaluator that utilizes my analytical, managerial, research, and training skills combined with cross-cultural and language ability.

SKILLS / ABILITIES

Nine years experience in the areas of business economics and public policy research and analysis; five years management and marketing experience in the area of small enterprise development; three years professorial experience in West Africa teaching theoretical and applied economics· two years experience in export management and marketing. Working knowledge of computer languages and statistical software including word processing and PC experience: Fortran, Wylbur, IDA, SPSS, PLANETS, BESTOP.

Broad under-graduate and pre-college background, including experience as general farm worker, dairy farm worker, cement finisher apprentice, bakers assistant, youth basketball coach, youth counselor, painting conservator assistant, salesman, painter (interior), building maintenance supervisor.

EDUCATION

The Johns Hopkins University, School of Advanced International Studies, 1985; Washington, D.C.
International Studies Program: International Economics - Degree candidate, M.I.P.P.

University of Baltimore, School of Business, 1984; Baltimore, Maryland
Graduate Program: Economics

University of Baltimore, School of Business, 1977; Baltimore, Maryland
Bachelor of Science: Business Administration and Economics

Community College of Baltimore, Baltimore, Maryland, 1975;
Associates in Arts: Arts and Science

COMMUNICATIONS

Limited professional proficiency (both spoken and written) in French; working knowledge of West African Pidgin (both spoken and written). Interested in improving french language skills, as well as, learning other languages.

EXPERIENCE

Economist, U.S. Department of Commerce, Bureau of Economic Analysis, Washington, D.C. 20230 - 11/83 to present.

RESEARCH and ANALYSIS

Conduct public policy research and analysis relating to government finance and policy issues and problems of government sector receipts and expenditures, particularly the effects of the economy on the budget and visa versa; the Federal sector of the National Income and Product Accounts (NIPA), tax policy, credit programs, and price changes in biomedical research and development; recommend policies and actions relating to assigned projects; and explore new directions in public policy research.

Current activities include preparing reports, studies, discussion papers, and technical contributions relating to the following projects:

(1) the analysis of the composition and source of change in Federal credit programs - finalizing a discussion paper - and Federal grants-in-aid to State and local governments -resulting in a discussion paper;

(2) compiled and computerized personal tax data for a study that analyzes differences between the behavior of actual individual taxes and those under a hypothetical indexed system - 80% complete;

(3) analyzed loan programs and their costs (non-course loans, defaults, and interest subsidies) - computerized the data, automated the method of calculation, and computed the estimates - 90% complete;

(4) collaborate in the preparatory work for reweighting and rebasing of the 1979 Biomedical R&D Price Index (BRDPI) for the National Institutes of Health (NIH)...in close consultation with team participants and technical departments; develop appropriate conceptual and methodological applications for price relatives; collect, analyze, and disseminate information, including replies to request for technical information on the BRDPI; assist in the execution of a executive summary and a detailed technical report of data sources and methodologies concerning the derivation of the 1984 base BRDPI; prepare, automate, and transmitt the final estimates to NIH; represent B.E.A. at meetings.

Historical accomplishments include the following:

- organized comprehensible resource documentation, developed data bases, and improved the computational system for the 1979 base BRDPI;
- prepared NIH budget reconciliations, annual estimates, a series of reports... identifying conceptual problems and amonalies, project evaluations, status reports, and recommendations regarding cost-benefit and utilization of a of a Paasche verses Laspeyers formula index;
- assisted the Research Director in drafting proposals and contract reviews surrounding the NIH project; and participated in several technical advisory meetings at the request of B.E.A. and NIH.

AFRICAN EXPERIENCE

Technical Advisor/Economics Teacher, U.S. Peace Corps/Cameroon, Government High School-Limbe, Limbe, Cameroon - 9/80 to 9/83.

EDUCATION

Assigned by the Ministry of National Education to Government High School-Limbe and Government Secondary School-Victoria.

Served as Department Head for Economic Studies, Pedagogic Advisor, and Class Master for Advanced students ("A" level).

Planned, organized, and delivered instruction in theoretical and applied economics (95%) and introductory literature (5%) to classes of 55 to 70 students each, at the 7th grade through 1st year of college equivalent; developed practical measures for the implementation of the overall economic studies program through:

- studies and prepared recommendations on instructional material, teaching aids, and related equipment;
- small scale analytical studies of teacher training and student education programs...in order to incorporate modules on motivation and study skill techniques;
- consultation with school officials to develop the economics cirricula and establish guidelines for the economics program;
- innovated approachs to extending the scope of applied economic studies.

PROGRAM MANAGEMENT

Designed, organized, and implemented training activities for new recruits such as work-shops and seminars with special emphasis on the Cameroonian, British, and French economic systems, within the frame-work of the Ministries guidelines.

Monitored area study materials, remedial study projects, and evaluated program implementation regarding student motivation and study skill techniques.

Drafted a preliminary training manual for technical co-operation projects and elaboration of training modules for economic education. Designed and implemented mock examinations for "A" and "O" Level National exam preparation.

Prepared reports for conferences, meetings of educators, and analogous committees; assisted the faculty in preparing, organizing, and assigning program schedules and time-tables for teachers and students; participated in exploratory and advisory missions; represented the school and Peace Corps at National pedagogic symposiums and National student evaluation conferences.

Conducted evening classes in applied economics at a local academy. Over a three year period, obtained over 2000 textbooks for the school library through the American Cultural Centers in anglophone and francophone Cameroun.

Assisted in the establishment of a on campus Boy Scout troop; organized a chess club; provided instruction and represented Government High School-Limbe in regional tennis tournments.

AFRICAN EXERIENCE

Business Development Advisor, U.S. Peace Corps/Cameroon, Limbe Chamber of Commerce, Limbe, Cameroon - 10/80 to 4/83.

In collaboration with the Director of the Limbe Chamber of Commerce, served as a Technical Advisor to small project committees of local entrepreneurs that included nearly 65 participants.

PROGRAM MANAGEMENT

Planned and executed educational seminars in small enterprise planning, management, and development; conducted work-shops addressing personnel management, operational controls, capital investment, and proactive management.

Trained managers and staff in proper management techniques and procedures, such as basic accounting, cost control, production planning, materials control, quality control, marketing, and distribution. Prepared guide-lines for implementing various tasks at each level of the enterprises development, especially financial planning; basically in the areas of long and short-term financing and short- term operating plans - budgeting, sales projection, break-even analysis, income statements and balance sheet preparation, and control systems for cash flow.

Provided individual consultation to several establishments concerning planning, development, and/or management relating to the following activities:

- isolation and identification of problem areas--start-up through the maturity stages of enterprise development;.
- traditional and alternative investment and financing schemes;
- international trade including importation of American products, locating foreign manufacturers and distributors, counter trade agreements (product buy-back or compensation, performance requirement, etc.)

MARKETING

Conducted a field marketing study and a product diversification feasibility study that presented the potential for income expansion and growth for selected businesses:

- set marketing objectives; developed product, pricing, distribution, and promotional strategies (for a local bakery, music shop, soft drink distributor, and book store).
- conducted a field survey and promotional campaign; sought new markets for a local beverage in populus but slightly remote areas....from the Littorial to villages along Lake Chad -distributing samples and posters enroute to Lake Chad and collecting product feedback enroute to the Littorial.

AFRICAN EXPERIENCE

Site Administrator Assistant/Logistician, Cooperative Education Training Program/ Peace Corps, Kumba, Cameroon - 8/82 to 9/82.

Six week project:

Assisted the Site Administrator in administering and coordinating the logistics of a co-operative education training program.

ADMINISTRATION/PROGRAM MANAGEMENT

Collaborated in the preparation of program budgets, financial reports, contract negotiations, commodity procurement, security deployment. Directed recruitment, hiring, and other phases of personnel operations.

Prepared reports summarizing administrative, managerial, and financial activities. Prepared guide-lines for security, maintenance, and dietary personnel for implementing their various tasks.

Managed program -dietetic, maintenance, and security- personnel and financial resources. Supervised and trained teams of dietary, maintenance, and security technicians and coordinated their duties; trained program technicians to perform their duties during training activities; explained Peace Corps policy, goals, and training objectives.

Performed a host of other tasks including driver, plumber, cook, laundry foreman, sanitation foreman, social activites co-director, and other tasks as they arose.

AFRICAN EXERIENCE

TECHNICAL TRAINER, Technical Education Training Program/Peace Corps, Mbalmayo, Cameroon - 8/81 to 8/81.

Two week education project:

Trained economics teachers for teaching assignments country wide. Special emphasis placed on local teaching techniques, cross-cultural education, and support system development.

ADMINISTRATION/PROGRAM MANAGEMENT

Set-up the infrastructural and institutional framework for the implementation of an on-going economics education project for new recruits (teachers); prepared a detailed plan of action to implement the project; supervised local staff for project activities; developed layouts for workshops with administrative assistance; prepared equipment and materials list; and advised on the administration of related training programs and training schedules.

Managed the overall establishment of physical facilities for implementing the project (i.e., purchased and allocated equipment and materials).

TRAINING

Trained teachers in teaching techniques and procedures such as motivational programming, appropriate technology utilization, lesson planning, examination systems (design, distribution, control, execution, and evaluation), material acquisition, and class control.

In collaboration with the Ministry of National Education representatives, conducted cross-cultural education workshops and symposia to assist teachers in improving their cultural awareness in such areas as human relations, dipolmacy, health and nutrition, personal hygiene, professional and social activities, security, and localized support system development.

EXPERIENCE

Junior Economist, U.S. Department of Health, Education, and Welfare, Social Security Administration, Office of Research and Statistics, Washington, D.C. - 6/77 to 9/79.

Under the supervision of the Branch Chief, conducted empirical research and preliminary statistical analysis related to income maintenance programs; particularly, the experience of black lung, brown lung, and Federal civil service annuitants under OASDHI; also the sick-leave experience of State and local government workers.

RESEARCH and ANALYSIS

Studied the financial organization of pension insurance funds and health insurance schemes. Examined and evaluated the economic impact of program policy changes on annuitants, taxpayers, and the Social Security Trust Fund.

Organized and conducted a preliminary statistical survey and trend analysis of the sick leave experience of State and local government workers; prepared projections and estimates; wrote a series of working-paper memoranda based on my finding.

Collaborated in a study that analyzed automated tabulations of Federal civil service retirees to determine the size, scope, and impact of "double dipping" (dual annuitants) under OASDHI; developed, automated, and implemented cost and time-saving programming techniques that simplified the analysis of tabulations on annuitants.

ACTUARIAL VALUATION

Reviewed actuarial and statistical aspects of planning, policy, and implementation of social security schemes. Conducted actuarial valuations of selected social security schemes, particularly black lung and brown lung schemes.

Applied basic actuarial techniques including data collection, selection of appropriate actuarial assumptions, computations, preparation of projections and estimates, and the preparation of preliminary actuarial reports in support of departmental policy analysis and for divisional review.

PUBLICATION and FIELD ACTIVITIES

Participated in technical co-operation activities including field assignments and exploratory missions. Attend and reported on a variety of Congressional hearing, public policy conferences, and professional symposiums.

Contributed to articles published in the June and July issues of the "Social Security Monthly Bullentin" and "Research and Statistics Note".

EXPERIENCE

Development and Marketing Director, The Alternative Distributors, Export Management Company, Incorporated, Baltimore, Maryland - 2/78 to 6/80.

ADMINISTRATION/PROGRAM MANAGEMENT

Collaborated in the marketing and management of an infant export management company that offered marketing and technical consultative service to domestic firms seeking to introduce agricultural and consumer products and services into African markets.

Administered public relations and fund-raising campaigns. Managed and co-ordinated promotional and fund-raising teams. Improved and expanded the existing communications network and committee work methods in support of promotional and fund-raising operations.

MARKETING

Assessed the requirements and prospects of successful introduction of agricultural equipment, food products, and services, including market potentials and market definitions at various levels of performance and price; required product and performance specifications; pricing in the markets; monitored commodities and the basis of competition; and reviewed distribution channels, service, and stocking requirements.

RESEARCH

Complied, analyzed, and evaluated data related to economic policy, commercial practices and regulations, and political risk conditions in target countries; utilized U.S. Department of Commerce, State Department, and foreign embassy information resources in preparing marketing reports, summaries, and country profiles.

BUDGETING

Prepare and monitored project budgets; based on projected operating cost, developed a budget for our trade conference and a budget for our trade mission to Nigeria.

PROMOTION/FUNDRAISING

Planned, developed, and implemented promotional strategies and a fund-raising campaign designed to attract financial support and provide exposure--for a trade conference and trade mission to Nigeria; seventy percent (70%) of the funding was obtained through the mobilization of business, political, and community support -- twenty percent (20%) obtained from Nigerian supportors; ten percent (10%) initial investment...all totaling nearly $44,000 dollars.

Prepared and submitted to the Board of Directors and organization officials basic goals and short range plans for future projects.

EXPERIENCE

Consultant, Blake, Sinclair and Associates, Baltimore, Maryland - 4/46 to 9/49.

Operated a small enterprise development and management consultative service which prepared business plans and provided technical assistance to small retail, manufacturing, and service enterprises.

ENTERPRISE EVALUATION

Assessed the financial, operational, and managerial state of the enterprise, particularly The Library - a local night club and cut rate establishment, Kai Designs - a retail clothing business, and Wright and Company - a local family grocer.

Developed feedback and control systems for cash flow, inventory, sales, and personnel -for The Library and Wright and Company.

Organized a series of fund raising and promotional events to attract venture capital and publicity. Secured backing for a series of shows and invitations to participate in two commercial exhibitions in New York.: Kia Designs.

MARKET RESEARCH ANALYSIS

Researched, and analyzed the export market for used farm equipment; compiled, analyzed, and evaluated market data pertaining to several West African markets, especially Nigeria. Conducted a series of interviews with representatives from Nigeria, Cameroon, Ghana, Benin, and Zaire to complete the study.

EDUCATION and TRAINING

GRADUATE STUDIES

International Economics		Credits
- Government Finance In Developing Countries	(SAIS)	4
- International Monetary Theory	(SAIS)	4
- International Trade Theory	(UB)	3
Macro-economics		
- Macroeconomic Theory and Policy	(UB)	3
- Economics and Business Forecasting	(UB)	3
Econometrics		
- Introductory Econometrics	(UB)	3
Micro-economics		
- Price Theory	(UB)	3
- Managerial Economics	(UB)	3
- Labor Economics	(UB)	3

Courses completed at The Johns Hopkins University, School of Advanced International Studies (SAIS) covered the period between 6/85 to 12/85. Washington, D.C.

Courses completed at the University of Baltimore (UB) covered the periods 1977-78 and 1/84 to 12/84. Baltimore, Maryland.

Total graduate credits to date=twenty-nine (29). Degree candidate.

U.S. Department of Commerce, Bureau of Economic Analysis, covering the period between 2/84 to present. Washington, D.C. Courses completed include:

- Computer Security	4 Hours
- Lotus 1-2-3	12 "
- Statistical Software Packages	36 "
- R: Base 5000	6 "
- Volkswriter Deluxe	6 "
- Basic Programming Language	20 "
- Fortran Language	20 "
- Cobol - 74 Programming	20 "
- Introduction to Honeywell 66/80	24 "
- Time Management Workshop	8 "

International Trade Administration, Regional Office, Baltimore, Md., 02-05/78.

Twelve weeks of seminars for exporters which included export development, financing, documentation, operating in foreign markets, etc.