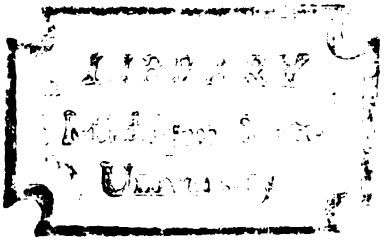

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EVALUATION OF A FARMER TRAINING PROGRAM

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Carl K. Eicher

Major professor

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EVALUATION OF A FARMER TRAINING PROGRAM IN NORTH CAMEROON

By

David Atwood

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ABSTRACT

EVALUATION OF A FARMER TRAINING
PROGRAM IN NORTH CAMEROON

By

David Atwood

Assessment of Cameroon's one-year Young Farmer Training Centers (YFTCs) showed uneven training results. Almost all trainee families return to their villages as farmers. Of eleven farming techniques recommended, four are widely adopted by trainees. Broader adoption is constrained by a technical package ill-suited to on-farm conditions. Of eleven other health and home economics practices, seven are adopted by trainees; adoption may be due in some cases to trainees' finances rather than training. While neighbors are familiar with trainees' new techniques, only one technique is adopted by neighbors due to trainee contact. An inadequate technical package and the government-induced social isolation of some trainees constrain broader diffusion from trainees to non-trainees. YFTCs need to undertake adaptive research to develop an appropriate technical package, and to recruit trainees as members of farming groups supported by the YFTC. Continued doner support is warranted to help reorient YFTC activities.

To my parents, Lois and Preston Atwood,

and my wife, Nancy Reuschel.

Their love and support

made it possible.

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The efforts of many people went into the making of this thesis, although I alone am responsible for its shortcomings.

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Finally, the interest and openness of the farmers of North Cameroon allowed me to gather the information on which my research is based. Although they will never read this thesis, I hope that its results return to them in the form of improved agricultural services.

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LIST OF ABBREVIATIONS

DEA	Department of Agricultural Education (Direction de l'Enseignement Agricole)
FTC	Farmer Training Center
IRA	Agricultural Research Institute (Institut de la Recherche Agronomique)
IUCW	International Union for Child Welfare (Union Internationale de Protection de l'Enfance)
MSU	Michigan State University
RCC	Regional Coordinating Center for the YFTCs (Centre de Coordination et d'Appui des Centres de Formation de Jeunes Agriculteurs (CCA/CFJA))
USAID	U.S. Agency for International Development
YFTC	Young Farmer Training Center (Centre de Formation de Jeunes Agriculteurs (CFJA))

CHAPTER ONE

INTRODUCTION

Africa contains two-thirds of the world's low income countries (IBRD, 1980, p.110) and is the only part of the world where per capita food production has declined since 1960 (Christensen,1981,p.iv). It is therefore imperative for African countries to adopt agricultural strategies which will increase food production. Agricultural strategies currently being pursued by some African countries include greater committments to agricultural research; increasing credit available to farmers so that they can make investments to increase production; and increasing agricultural extension and training available to farmers.

This last strategy of providing farmers with more extension and training has received substantial committments of resources in many African countries, although there has been little empirical work on the value of agricultural extension in increasing production in Africa. What work has been done has given mixed results (Marticon, 1973; Saylor, 1974; Lockheed et al., 1980).

There has been even less work on the value of residential farmer training, although residential farmer training centers (FTCs) are spread throughout Africa. FTCs take many

forms. East African FTC's train farmers in crop husbandry and in the use of new inputs during sessions lasting several days. Gambia's Mixed Farming Centers and the seasonal schools (écoles saisonnières) of French-speaking Africa have trained farmers for several months in animal traction. The rural family centers (maisons familiales) of French-speaking Africa alternate training sessions with family farm work during two years for young people chosen as representatives by their village.

The little that has been written about African FTC's concentrates on their management. There have been very few assessments of their impact on trainees' subsequent well-being or agricultural production. Attempts at such assessment have been either inconclusive (Francke, 1974; Petrini, 1973) or unfavorable (Lefebvre and Lefebvre, 1974; Honeybone and Marter, 1975).

The problem addressed in this thesis is to assess the value of residential farmer training in increasing agricultural production and in helping farmers. The two objectives of this thesis are (1) to evaluate one farmer training program, the program of Young Farmer Training Centers (YFTCs) located in North Cameroon, which trains young farm families for a year in improved technology focused on animal traction; and (2) to make policy recommendations based on the results of the evaluation.

The evaluation of the YFTC program began in 1979 when two faculty members from Michigan State University, at the

request of the U.S. Agency for International Development (USAID), undertook a three-week review of the YFTC program in Cameroon. The report which followed their review recommended that a useful evaluation of the YFTC program required an in-depth study based on survey data from both program participants and non-participants.

An in-depth study was financed from the Operational Program Grant made by USAID to the International Union for Child Welfare (IUCW) for support of the YFTC program. In August 1980, MSU and the IUCW agreed on the terms of reference for the in-depth evaluation, to take place from September 1980 to March 1981. The evaluation was directed by one MSU faculty member who was involved in the initial review; it was conducted by the author, who worked in the field in September 1980 and from January to March 1981.

A major concern of the MSU team was that the results of the evaluation be useful not only to the donor agencies, but also to the government of Cameroon. Every step of the evaluation was therefore taken in close collaboration with YFTC program staff; they helped determined performance criteria, elaborate and test questionnaires, interview respondents and analyze the data. Participation by YFTC program staff in the research process as well as in the elaboration of program recommendations was absolutely crucial to the success of the research effort. This thesis has greatly benefitted from their help.

In March 1981 the MSU team prepared a preliminary report based on partial data analysis. The YFTC program staff had never seen, much less been asked to comment on, the recommendations of several previous evaluations. In contrast, the MSU preliminary report raised a number of questions about the YFTC program and was widely circulated among the staff of the YFTC program. The prelimary report was presented for review at a meeting in Dadjamka, Cameroon in March 1981, attended by all YFTC program staff and supervisors; by representatives of USAID, the IUCW, and various Cameroonian agricultural agencies; and by the MSU team. At this meeting, recommendations were suggested, discussed, and agreed on. A final report was written at MSU based on further data analysis. The recommendations of the final report were based on the March discussions and on later written comments by YFTC and IUCW staff.

This thesis expands on the final report to include a more complete data analysis, a discussion of the methodology used, and a review of the FTC experience elsewhere in Africa. The outline of the thesis is as follows:

Chapter Two reviews results of a number of studies of African agricultural training programs.

Chapter Three describes the YFTC program and its geogrphical, institutional, and historical background in order to provide the context for understanding both the program's role in Cameroonian agriculture and the evaluation methodology used to assess that role.

Chapter Four analyzes methodologies used to evaluate other farmer training programs. Chapter Four then describes the evaluation methodology of the present study.

Chapter Five evaluates the YFTC programs, "training effect," that is the effect of the program on trainees.

Chapter Six discusses the YFTC program's "diffusion effect," that is, the effect of the program on non-trainees who may learn new agricultural techniques from observing or listening to a trainee.

Chapter Seven examines the role of one YFTC as a resource and extension center for farmer's in its area.

Chapter Eight summarizes the findings and discusses the policy implications of the study for the government of Cameroon and the donors who have supported the YFTC program.

CHAPTER TWO

SURVEY OF RESEARCH ON FARMER TRAINING CENTERS IN AFRICA

There are two conflicting bodies of evidence concerning the value of agricultural training in Africa. A growing set of microeconomic studies suggests that many agricultural extension programs are neither helping farmers nor leading to increased production. (Marticou, 1973; Saylor, 1974). On the other hand, Lockheed et al.,1980 review a number of studies which show the positive value of agricultural training and extension on production in developing countries. In the face of increasing financial commitments to agricultural training by national governments and donors, it is imperative for policy-makers to have the information needed to make decisions to invest in agricultural training programs which are productive.

This chapter reviews studies of FTCs in Africa. Most studies of FTCs concentrate on management and pedagogy. This review will look at three additional aspects of FTC programs--technical recommendations, farmer participation, and the role of FTCs as development centers.

FTC Technical Recommendations

The effectiveness of an FTC program is heavily dependent on the quality of its technical recommendations. A primary objective of most FTCs is to train farmers in new productive technologies capable of on-farm replication. USAID (1976) claimed that for trainees at Cameroon's YFTCs, "Significant increases in yield can be obtained by introducing simple improved cultivation techniques which are easy to assimilate and can be widely propagated." (p.3). In reviewing a number of FTC programs in English-speaking Africa, Markham (1967) asserts that it is necessary for an FTC trainee "to observe the new techniques being successfully employed in circumstances with which he is familiar". (p.11).

Often, however, FTCs train farmers in techniques which are inappropriate to their on-farm conditions and cannot be used after training. FTCs, like extension services, rely for their technical recommendations on either national agricultural research stations or (in the case of former French colonies) regionwide recommendations based largely on research done at Bambey, Senegal (cf, France, 1974). Agricultural researchers may not have either the understanding of local on-farm resource constraints or the incentives required to develop technologies appropriate to on-farm conditions. Nor does one-way dissemination of information from agricultural researchers to extension staff (and FTC staff) promote better understanding of local conditions by researchers. (Belshaw and Hall, 1972). An FTC program can be effective only if

the research on which its recommendations are based responds to farmers' problems and constraints.

Few FTC studies are very specific about recommended practices, which are often assumed to be productive and appropriate. Three general types of technical recommendations made by FTCs will be explored here--sole-cropping and row-seeding, promotion of new inputs or crops, and use of new equipment.

Sole-Cropping and Row-Seeding

Planting several crops in mixtures on the same field has been done traditionally by farmers in Africa and in other parts of the tropics (Monyo, Ker, Campbell, 1976, p.5). Colonial administrators and their African successors in Ministries of Agriculture have attempted to discourage intercropping and to promote the planting of crops in rows and sole stands. Sole-cropping and row-seeding are taught at Cameroonian, Malian, and Tanzanian FTCs (Bingen, 1976; Petrini, 1973, p.182).

Despite exhortations by staff of FTCs and of extension and research agencies to plant in rows and sole stands, most small farmers in Africa continue to intercrop (Belshaw and Hall, 1972; Manyo, Ker, and Campbell, 1976, p.5). According to a number of studies, small farmers in many parts of Africa are perfectly rational when they intercrop (cf. Monyo, Ker, and Campbell, 1976). Evidence from many parts of

Africa suggests that intercropping increases returns to land (Norman, et al., 1979, pp. 59ff; Andrews, 1972, 1974; Grimes, 1963; Keswani, et al., 1977). It may also increase returns to labor (Norman et al., pp. 59ff). It is less risky than sole-cropping since if one crop fails, at least some of the intercrops will generally produce (Belshaw and Hall,1972,p. 56). Recommendations by FTCs and extension agencies to plant crops in rows and sole stands are therefore often inappropriate for small farmers in Africa.

New Inputs and Crops

FTCs often teach trainees the cultivation of new crops and the use of new inputs. In Zambia, farmers with greater than average resources were able to successfully adopt the cultivation of cash crops (cotton and sunflower) following training at an FTC). However, the majority of trainees did not adopt these new crops after training because they did not have either the labor or the cash required to shift their farming operations towards them (Honeybone and Marter, 1975, pp.65-65).

Poor Kenyan farmers were taught how to grow hybrid maize at an FTC. Following training they were given an in-kind loan of fertilizer and hybrid seed. Evidence from Ascroft, et al.,(1973) suggests that one hundred percent of the trainees used the fertilizer and seed. It is unclear, however, if they planted hybrid maize in subsequent years and if it was a technology suited to their low-resource

situation. Gerhardt (1974) cites evidence that Kenyan FTCs have helped to speed the diffusion of hybrid maize in some areas, but he believes that hybrid maize may not be adapted to low-rainfall areas of Kenya.

One Chadian FTC encouraged female trainees to grow fruit trees and to shift land used for traditional vegetable cultivation to the growing of tomatoes and lettuce. However, purchase of young fruit trees was beyond the trainees' financial abiility. And the "modern" vegetables could not be preserved as well as the traditional ones (Lefebvre and Lefebvre, 1974, pp. 304 ff.)

New Equipment

Many FTC programs train farmers in the use of new equipment. Evidence on the effectiveness of such training is mixed. Bingen (1976) cites the success of the Malian seasonal schools in the 1960's in training young men to use oxen and plows. But equipment demonstrated at FTC's is not always capable of being used by farmers. Gambian Mixed Farming Centers trained farmers to use a tool bar which was too heavy for their animals to pull (Weil, 1969, p.38). The Mixed Farming Centers also trained farmers in oxen traction at the same time that large numbers of farmers on their own were spontaneously shifting from hoe cultivation to horse and donkey traction (Metrick, 1978).

The majority of trainees from some Malian FTC's claimed to be unable to apply at home what they had learned in training.

Training had focused on the use of modern equipment, such as seeders, which was unavailable to farmers (Bingen, 1976, p. 56).

Farmer Participation in FTC Programs

An FTC's impact on agricultural production depends in part on the number of farmers it reaches, both directly, through courses, and indirectly, through former trainees' contacts with their neighbors. Evidence from a number of FTCs suggests that often very few farmers are reached by training programs. Courses are often not filled. Even when they are filled, women or poor farmers may be excluded from training. FTCs sometimes recruit farmers who are likely to have little influence on their neighbors following the training program.

Course Attendance

Many farmers show little interest in FTC courses, and FTC facilities are often underutilized. Courses at Gambia's Mixed Farming Centers have been filled only to 70 percent of capacity (Mettrick, 1978). In Zambia, FTC courses were filled to 54 percent of capabity. Even to attain 54 percent attendance, FTC staff recruited the same farmers to take the same course several times in succession (Honeybone and Marter, 1978, pp. 27-28).

Farmers may lack interest in attending an FTC course for two reasons. They may be well-informed about the inappropriateness of the FTC's technical recommendations. Or they may be poorly informed about their eligibility for FTC courses. In East Africa, FTC recruitment is often done by the agricultural extension service (Barwell, 1975, p.30). Several studies of East African extension personnel show the very limited contacts that they have with farmers (Saylor, 1970; Leonard, 1977, pp. 31-32). With such limited contacts it is to be expected that many farmers are not informed of upcoming FTC courses. Despite farmers' lack of interest and poor attendance in courses, some FTC's may be more cost-effective than existing extension services. The cost per farmer contact-hour of agricultural extension is 33% less than that of FTC training in Zambia (Honeybone and Marter, 1975, p.37). It is therefore, inaccurate to assert a priori that because of their problems residential farmer training programs are less efficient in reaching farmers than agricultural extension programs.

Participation of Progressive Farmers

FTC's often recruit farmers with more resources and higher levels of crop husbandry (Barwell, 1975, p.31). While this may sometimes be government policy, often it is a function of the personal perferences of FTC staff. Staff may find these "progressive farmers" more receptive to FTC recommendations and better able to implement them, especially if such

recommendations require higher than average resource endowments. FTC staff may also find it easier to establish contact with "progressive farmers". For example, Kenyan FTC staff were unable to recruit any but progressive farmers, even in the face of a directive to recruit only poorer farmers. (Ascroft, et al., 1973, p. 63 ff). Government policies to recruit progressive farmers for FTC training are often based on a communications theory of the progressive attributes of "opinion leaders". (Ascroft et al., 1973, p. 17, 18). According to this theory, transmittal of "messages" about new agricultural techniques to opinion leaders is the most effective way to insure that the "message" will have the widest possible diffusion (Ascroft et al., 1969, p. 128-30; Moris, 1967, p. 353-354).

The progressive farmer strategy has been faulted for being inequitable, since the earliest adopters of a new technique, the progressive farmers, may be the only ones to benefit from it, (Ascroft et al., 1973, p. 18). The strategy may lead to the formation of a well-off rural entrepreneurial class, (Schouherr and Mbugua, 1974; Lefebvre and Lefebvre, 1974, p.196; Weil, 1969, p. 38-39).

There is mounting evidence that the communications theory behind the progressive farmer strategy may be based on a misunderstanding of African village life, for two reasons. First, agricultural recommendations appropriate to the conditions faced by progressive farmers may not be feasible for poorer farmers; "early adopters" may be the only adopters

of some agricultural innovations. In these situations, Ascroft (1973) and Honeybone and Marter (1975) have suggested developing different FTC courses for groups of trainees with different resource endowments, so that each group would learn productive techniques usable under the conditions it faces.

Second, farmers recruited for their "progressive" attributes may not be better opinion leaders than poorer farmers. Two Kenyan training experiments showed poor farmers to be good diffusers of hybrid maize cultivation (Ascroft, et al., 1973). Also, when FTC or extension staff target progressive farmers, they single them out; individuals who are singled out in rural Africa are often less likely to be opinion leaders than are people dealt with as members of a social group (Belloncle, 1979, p. 185ff). Hulls (1971) says, "There is no point in seeking to encourage individual adoption of innovation in a local society which does not sanction individual achievement" (p.47).

One way to avoid the problems of equity and of social isolation embodied in the progressive farmer strategy is group recruitment. Farmers are chosen by their neighbors to undergo FTC training, on the understanding that after training they will diffuse new techniques to their neighbors (Honeybone and Marter, 1975, p.86). This is similar to recent methods of group extension used by the World Bank (Benor and Harrison, 1977) and by Belloncle (1979) to speed the spread of new technologies.

Participation of Young, Unmarried Men

Many FTCs recruit young, unmarried men with the intention of providing them with the knowledge and training needed to become progressive farmers. The Gambian Mixed Farming Centers recruited such young men (Mettrick, 1978) as have various Cameroonian FTCs. Results in Cameroon have been disappointing: Former trainees have often migrated to the city rather than return to farming; those that return to their villages have little influence on their neighbors, who tend to scorn them instead of learning new techniques from them (Marchand, 1974, p. 543). When these young trainees are not farm decision-markers and do not have access to their own land, it is to be expected that FTC training is inadequate to make them into progressive farmers.

Participation of Women

Adult African women in many rural areas are farm decision-markers who can benefit from appropriate agricultural training (Staudt, 1978, p.442; Lele, 1975, pp.76-77). However, most YFTC's provide women with less training and with lower quality training than men.

Some FTCs in East Africa provide agricultural training for farm operators of either sex (Barwell, 1975, p.45). In Kenya, these courses are attended by a disproportionately small number of women (Staudt, 1978, 1975-76). Women's

attendance at Zambian FTC's courses is quite low (Honeybone and Marter, 1975, p.29). Mettrick (1978) observed that the Gambian Mixed Farming Centers effectively excluded women from training by ignoring the cultivation of swamp rice, an important crop grown by women. Women at FTCs may be taught by poorly trained or incompetent female trainers (Lefebvre and Lefebvre, 1974, p. 549). Many FTC courses for women place little emphasis on their role as farmers, concentrating instead on health and home economics (Barwell, 1975, p.45).

FTCs As Local Development Centers

Many FTCs have functions beyond the agricultural training of farmers. East African FTCs have evolved from a narrow focus on agricultural training under the aegis of the Ministry of Agriculture to a much wider focus which involves support for programs of cooperatives, community development, and adult education, (Barwell, 1975, p.38; Kinyanjui and Ng'ethe, 1976, p.2). Gambia's Mixed Farming Centers undertook extensive research on animal traction equipment and fertilizer use (Weil, 1969, p.38-40). FTCs in East Africa provide in-service training for agricultural extension staff (Barwell, 1975, p.26).

Some FTCs with substantial support from donor governments or churches have grown to be multipurpose human service centers engaging in agricultural training, health care, and retailing of some basic products needed by farmers. The

Kibaha and Isinya centers in Tanzania and Kenya are examples (Mhina, 1972; Schlueter and Armstrong, 1975).

The goal of the maisons familiales in French-speaking Africa is to become local resource centers directed and used by villagers. Each maison familiale has a farmer's association which helps it decide on course content and on activities it will undertake in villages (Lefebvre and Lefebvre, 1974, p. 11 ff). Malian FTCs performed none of the functions mentioned above nor did they even collaborate with the extension service in the training and follow-up of farmers (Bingen, 1976, p. 58-59).

Summary

Most FTC studies have concentrated on management and pedagogy. There is an underlying assumption in these studies that the technical package diffused by an FTC is appropriate and useful to farmers. However, those studies which have analyzed FTC technical recommendatiions have shown in many cases that an FTC's technical package is not appropriate to local on-farm conditions. FTC technical recommendations come either from national research agencies or--for former French colonies--from research conducted in Senegal and then diffused throughout West Africa. Recommendations coming out of such research are often inappropriate to on-farm conditions in the area surrounding an FTC. One reason for the poor course attendance noted in many FTCs may be that farmers

rightly perceive no advantage in learning and applying techniques being taught at the FTC. It is clear that any evaluation of a farmer training program must concern itself with the program's technical recommendations.

FTCs often have limited contacts with farmers and poor course attendance. Literature has shown that women farmers may benefit little or not at all from FTC training. Many FTCs focus on progressive farmers; there is evidence that this leads to two problems. The FTCs may make recommendations usable only by progressive farmers, so that poorer farmers cannot adopt them. And concentrating on progressive farmers may isolate them from their communities, making them less influential and slowing the diffusion of new technologies. Group recruitment for FTC training has been proposed to avoid this problem.

FTCs serve as local development centers in several ways. They may provide training in non-agricultural subjects. They may train agricultural staff. Or they may meet the material needs of their communities. Some FTCs perform none of these functions.

CHAPTER THREE

THE BACKGROUND AND CURRENT OPERATION OF THE YOUNG FARMER TRAINING CENTERS

This chapter outlines the geography of Cameroon's Northern Province, where the YFTCs are located. It then describes agricultural development and agricultural education efforts in the Province. Finally it describes the history and current operation of the YFTCs.

Cameroon and the Northern Province

Geographical Background

Cameroon is a middle income developing country located on the west coast of Africa. Per capita income is $460. While Cameroon has shown respectable industrial growth rates in recent years, its economy remains overwhelmingly agricultural (IBRD, 1980, p.140; Ekani, 1980).

The YFTCs are located in Cameroon's Northern Province, a Sahelian area which is the poorest part of the country. The extreme eastern area of the province, bordering Chad and situated on the Logone River floodplain, is a rice producing area. The western part of the province is a mountainous area. The central part of Northern Province is where most of the

YFTCs are located. Millet and sorghum are the major staple crops, and are often grown in crop mixtures with other food crops. Several dry season sorghum varieties permit a second crop in many parts of the North. By far the most important cash crop in the North is cotton.

The Moslem Fulbé are the dominant ethnic group in Northern Province. They gained control of much of the area, and subjugated many of its non-Fulbé ethnic groups, in the early nineteenth century, several decades prior to the establishment of a European presence in the North (Azarya, 1976, pp.11-12, 23). The Fulbé's control of land, commerce, cattle production and politics in the region far exceed their numerical representation. Consequently, many non-Islamized non-Fulbé in the North (referred to collectively as "Kirdi") must either rent land from the Fulbé or hire themselves out as farm labor (Azarya, 1976, pp. 57-58).

The Kirdi peoples often live in close proximity to the Fulbé. Some Kirdi are farmers and cattle raisers. Others are exclusively small stock raisers with little or no interest in cattle raising.

Agricultural Development Strategy in North Cameroon

The Cameroonian government is concerned about unemployed rural youth, about farmers with limited ties to the national economy, and about agricultural stagnation (Ekani, 1980). These concerns, voiced on numerous occasions by President

Ahidjo,[1] are the basis for the government's agricultural development strategy in the Northern Province. The strategy is one of intensification of agricultural production through heavy state intervention in production and marketing. Government efforts are oriented towards cotton, although food crop production has been receiving some attention recently. Rural youth are viewed in the government strategy as the foundation for the modernization of Cameroon's agriculture.

Cotton research is done by the regional agricultural research institute (IRA) established in the 1940s. IRA is located in Maroua, the second largest Northern city. Although IRA concentrates on cotton it has recently increased the resources it devotes to food crop research.

Cotton production and marketing are the responsibility of the parastatal agency, Sodecoton. Sodecoton's predecessor, the French Fiber and Textile Company (CFDT), entered Cameroon in the early 1950s and introduced widespread cotton farming. In 1974, the CFDT was partially nationalized and became Sodecoton. Cotton production became more labor-intensive and capital-intensive, with Sodecoton providing farmers with inputs and more frequent extension advice (Hoogstraten, 1978, p.31). Animal traction, long promoted by the CFDT, became an even more important part of Sodecoton's cotton production package. It is still only a small minority of Northern farmers who own oxen and traction equipment, however. Despite the nationalization of the CFDT, Sodecoton's services to

farmers are often characterized as authoritarian and obligatory rather than advisory.[2] Sodecoton is the only source of fertilizer in the central area of the province, and its fertilizer is intended for use only on cotton.

Parallel to Sodecoton is the government extension service, referred to in its early days as Semnord. The extension agency is presently organized as a system of agricultural posts. Resources of the agricultural posts are limited. In theory, extension agents from the agricultural posts concentrate their efforts on food crop production. In fact, extension agents spent some of their time helping Sodecoton in promoting cotton production. The parallelism between the two agencies will soon be ended when--with World Bank financing--Sodecoton absorbs the agricultural posts. Sodecoton will then promote production of both food and cash crops, expanding land planted to cotton while reducing land planted to food crops and increasing food crop yields (Cameroon, Projet de Developpement Rural, 1979).

Cameroon's strategy in the North also includes bringing "new lands" into production. Migration is encouraged from densely populated areas to sparsely populated ones, especially by young families.

Agricultural Training in the North

According to government policy, the modernization of agriculture in the North requires a dynamic youth, trained

in new techniques and eager to remain on the land as modern farmers. Several uncoordinated programs currently exist to train young farmers in "modern" farming techniques.

The government Civic Center in Langui, Northern Province is part of a national network of Civic Centers providing paramilitary and agricultural training for youth. The Langui Civic Center trains young men, during a year-long residence, in modern agricultural techniques focused on animal traction. At the end of training, participants receive animal traction equipment and two oxen. However, many of the trainees do not return to their villages, but sell the oxen and equipment and move elsewhere (Sodecoton, 1980, ch. 3.4).

The Catholic Church has run a rural center in Fignolé for almost two decades. In its early years the Fignolé training program was quite similar to that of the Civil Center--young men trained for a year and given animal traction equipment and oxen. Results were also the same: many trainees sold their oxen or equipment and left (Marchand, 1974, p.543). The same phenomenon occurred for one of the first animal traction development schemes in the North when it recruited very young, single men for training in 1938. (Guillard, 1965, pp. 216-17).

Until the YFTC program became part of the Ministry of Agriculture, a number of FTCs existed in the North, offering short courses to farmers. While some of these centers have now become part of the YFTC program, there is one that remains.

However, it has not offered courses in quite a while although it continues to be staffed by government civil servants.

In addition to the Fignolé center there are other private agricultural training initiatives. These include Catholic Agricultural Youth groups in villages as well as INADES correspondence courses.

The Cameroon government encourages participants in some government training programs, including the YFTC and Langui programs, to return to their villages by giving them a "reinstallation subsidy" of $1500 with which to build a modern house, buy food and other family necessities, and purchase agricultural equipment. The reinstallation subsidy is 45 percent grant and 55 percent loan.

The funds are administered by agents of Sodecoton's Young Farmer Service, which is responsible for following up the activiites of former trainees from the YFTCs and the Langui Civic Center. When they return to their villages, trainees in each village are encouraged to relocate all together in the same part of the village and to use their reinstallation subsidies to build themselves modern houses with tin roofs. Sometimes a well is dug very close to their houses.

The Doukoula-Dadjamka Area

The broader part of the evaluation research took place in the recruitment area of the Dadjamka YFTC, located in the

arrondissement of Doukoula. The arrondissement contains the three counties of Doukoula, Tchatibali, and Kalfou. The survey took place in Doukoula county. The town of Doukoula is the administrative center of the area, being the capital of the county and of the arrondissement as well. Doukoula is also a market center with a small daily market and a large weekly one. Residents of even the most outlying villages in the area where this research took place visit Doukoula on market day or for celebrations. Doukoula has approximately 3800 residents; the entire county has 36,000.[3] Dadjamka, where the YFTC is located, is six kilometers from Doukoula.

Doukoula county, and the major part of the arrondissement, are populated by the Toupouri ethnic group, one of the few ethnic groups in the North which have successfully resisted Foulbé conquest or economic and cultural domination. Although Fulbé control some of the exterior commerce and organs of government administration of the area, the Toupouri alone control land, cattle and agricultural production, and the traditional administrative appartus. Unlike young men from Kirdi ethnic groups whose land is controlled by the Fulbé, young Toupouri men have access to enough land that they can cultivate their own dry season sorghum crops. They therefore do not have to hire themselves out to Fulbé land owners in the dry season,[4] as is the case for the other Kirdi men.

The Toupouri are cattle-raisers as well as farmers. The cattle-to-person ratio among the Toupouri is greater

than in either France or Rwanda-Burundi (Guillard, 1965, p.316). Cattle are an integral part of the Toupouri economy and culture. Cattle are particularly important as bride-price, a major vehicle of wealth transfer (Podlewski, 1966, pp. 79ff). The bride-price system has an important impact on social standing. A young man may have to wait many years to be married if he has few sisters, sisters who could, upon marriage, bring into the family new wealth which might be used in the future to pay his own bride price. The same is true if a young man has many older brothers, who will drain the family's wealth with the bride-prices they pay at marriage (Guillard, 1965, p.135).

Toupouri population density (68 people per square kilometer) is extremely high for Africa (de Garine, 1978, p.43). Population pressure on the land has resulted in tenure disputes, emigration of farmers to other areas, and a traditional agriculture which is very labor intensive for sub-Saharan Africa (Guillard, 1965, pp. 160-1). Abundant dry season sorghum crops and heavy manuring of fields allow the land to support its dense population.

Experience with and use of animal traction is widespread in the Doukoula area; it was introduced there in 1938 (Guillard, 1965, p.216). Interest in and use of animal traction became widespread in the mid-1950's under the impetus of the local section of Semnord. As a result of Semnord's remarkable efforts (cf. Guillard, 1965), and of the Toupouri's interest and ability, which may be attributed in part to their

longstanding experience as cattle-raisers, the Doukoula area in 1964 had the second largest number of plows per capita, and the largest number of carts per capita, in North Cameroon (CFDT, 1965, p.9). Agricultural technicians no longer teach farmers how to train their animals for plowing because farmers learn this as young men from their family and friends.[5] There is an active market for cattle in the Doukoula area and most cattle used for animal traction are local. Plows and other traction equipment are available from the YFTC, the agricultural post in Doukoula, and two Sodecoton offices, all with some credit financing available. Also, plows are occasionally bought from individuals.

The YFTC Program

Background

The first YFTC was established in Goyang by a private Swiss aid organization in 1969. It was independent of the Ministry of Agriculture and staffed by expatriate technicians. The Goyang YFTC originally followed the pattern of the FTCs in Fignolé and Langui: it recruited young single men for a year's training, at the end of which they received animal traction equipment and oxen. The Goyang YFTC encountered problems similar to those of the Fignolé and Langui centers; many of its trainees never returned to their villages, but sold their equipment and moved to the city (Kamajou and Gow, 1979, p.2.; IUCW, 1976, p.8.).

In 1973, the Goyang YFTC changed its recruitment policy. It recruited its first class of young, married couples. The recruitment process was very methodical--YFTC staff wanted couples with adequate land resources, with community ties, and with no lingering debts or disputes which would keep them from returning to their village as well-equipped farmers after the training program. This new recruitment policy was successful in choosing trainees who wanted to return to their villages. Almost all YFTC trainees have returned to their villages, while a large proportion of trainees from the Langui Civic Center, which still recruits single men, have not (Sodecoton, 1980, ch.3.4.).

In 1974, a second YFTC was opened, this one in Dadjamka, also built with Swiss aid and staffed by a team of Cameroonians and expatriates. The Dadjamka YFTC recruited young couples from its inception. In 1975, the two YFTCs were integrated into the Ministry of Agriculture's Department of Agricultural Education (DEA); shortly thereafter they were fully staffed by Cameroonians, but continued to receive some outside funding. In 1977, USAID awarded an operational program grant to the Swiss IUCW to built and help staff a Regional Coordinating Center (RCC), and to build several more YFTCs. As of 1981, 3 more YFTCs, as well as the RCC, had been built and staffed.

Staffing and Management

Regional Coordinating Center. The role of the RCC is to provide supervision and technical assistance to the YFTCs.

RCC staff include a Cameroonian director, an expatriate training adviser and his Cameroonian counterpart, and an expatriate coordinator of women's activities. Initially it was planned that the RCC would be staffed also by two agronomists and a rural social scientist, but these additional professionals were not hired. Cameroonian RCC staff have at least three years of post-secondary technical education.

The government of Cameroon makes an annual budgetary allotment to the RCC. In 1981-82, this allotment will be approximately $36,000. In addition, the RCC receives personnel and material support from the IUCW, USAID, the Dutch volunteer organization, and other doner agencies.

YFTCs. Each YFTC contains staff housing, a trainee village, and a large farm. The YFTC director has substantial decision-making power in managing the various parts of the center. He decides how to use the revenue generated by the YFTC farm's harvest in order to get the best oxen and equipment for each class of trainees.

The YFTCs are run on an annual budget allotment from the Cameroon government. In 1981-82, the allotment of the Dadjamka YFTC will be $45,000. In addition, YFTCs obtain revenue from selling the harvest from their farms each year. Some YFTCs have distributed food from the World Food Program to trainees at the center.

Each YFTC director is a civil servant, as are his immediate assistants, the farm chief and the follow-up chief. The farm chief is responsible for managing the YFTC's farm

and for organizing the training that takes place on it. The follow-up chief is responsible for recruitment and follow-up of trainees. Both have two or more years of secondary school followed by three years of technical training, while the director has four years of technical training beyond the completion of secondary school.

In addition, each YFTC hires a number of contractual employees. One of these is a female women's trainer,[6] and another helps the farm chief and the follow-up chief. The rest are laborers, clerical workers, and a mechanic.

Training Program

Recruitment for the program is done over a period of three months, with ten meetings in each village. The YFTC staff decide, on the basis of these ten meetings, which young farm couples are most likely to benefit from training and to return to their villages as better farmers. It is these couples who are chosen for training.

Training at the YFTC lasts almost one full year. During that year trainee families live in the village which is part of the YFTC. Trainees live an entirely different lifestyle from their accustomed one. Life at the YFTC is quite regimented. Trainees may not leave the center without permission; they work on the fields that they are told to work on; production,sale or consumption of alcohol is prohibited. (This has a serious negative impact on trainee women, one

of whose main income sources is production and sale of millet beer).

Because life at the YFTC is so different from traditional village life, and because the Swiss who planned the YFTCs were conscious of the dangers of losing trainees to the temptations of the city, the YFTC village is constructed in the local style. Each family has its own hut, with a grass roof, and its own kitchen. The local style is much improved upon, using cinder-block rather than mud brick, but the hope is that trainees will not feel alienated from traditional village life. Each family does its own cooking, as it would at home, using food and supplies it brought from home.

Agricultural training is focused on the use of animal traction technology and on row-seeding, rotations, sole-cropping, seed treatment, storage, and the agricultural calendar. Agricultural training is largely learning-by-doing on the YFTC's extensive farm. There are also demonstrations, and--for the men--occasional classroom training. Women receive occasional classroom training in health, child care and home economics.

Trainees receive animal traction equipment and a pair of oxen at the end of training. These are not gifts, however. Half of the value of the equipment and oxen comes from the reinstallation subsidy as an in-kind loan to be reimbursed. The remaining half comes from sale of the harvest of the YFTC

farm. A substantial portion of the harvest's value represents a return to trainees' labor on the YFTC farm; therefore, much of the remaining half of the value of oxen and equipment represents a payment to trainees for their work on the YFTC farm.

When they return to their villages after training, trainees receive the reinstallation subsidy and--within the same village--are encouraged to relocate to a single area. Sodecoton's Young Farmer Service, the agricultural posts, and the YFTC follow-up chief all have specific directives to pay special attention to former YFTC trainees and to make sure that they have good extension advice.

Summary

The YFTC program is located in the poorest province of Cameroon, the Northern Province. Most YFTC's in the North are located in areas where the Fulbé ethnic group controls land rights as well as political and marketing institutions. The Dadjamka YFTC is located in the Doukoula area, where the Fulbé have little power. The Doukoula-Dadjamka area is populated almost entirely by the Toupouri, a cattle-raising and farming group many of whom have been using animal traction for 25 years.

A number of other agricultural education and agricultural development institutions exist in the Northern Province. The most important and extensive of these is Sodecoton,

a parastatal cotton production agency. One section of Sodecoton, the Young Farmer Service, provides a substantial government "reinstallation subsidy" to trainees from the YFTCs and from other agricultural development schemes.

The YFTCs provide a year of residential training focused on animal traction technology to young farm families. Families receive equipment and oxen at the end of training. The first YFTC, in Goyang, was started by a Swiss aid agency in 1969. In 1974, the second YFTC opened. There are currently five YFTCs, fully staffed and supported by the Cameroon government. The RCC, staffed and supported by both the government and donor agencies, provides limited supervision to the YFTCs.

ENDNOTES FOR CHAPTER THREE

[1]For example, his speech at the National Agricultural Fair, February, 1981.

[2]See Kamajou and Gow, 1979, p.7, and Pahai,1975. To the extent that such characterizations are accurate, Sodecoton is following in the tradition of the CFDT (Guillard, 1965, p. 272).

[3]I am indebted to John Holtzman and Gabrial Sirandi for these population figures from the 1976 census.

[4]Bingen, personal communication of results of informal interviews with Toupouri farmers in September-October, 1979.

[5]Chief of agricultural post (Ourlargo), personal communication.

[6]It was only in 1981 that all the YFTCs received a budgetary allotment to hire a female trainer. However, both the Goyang and Dadjamka YFTCs had female trainers at the time that the female trainees interviewed for this study were undergoing training.

CHAPTER FOUR

EVALUATION METHODOLOGY

The objective of this chapter is to describe the methodology developed to evaluate the Cameroon YFTC program. The chapter is divided into two sections. The first section discusses various methodologies, including those used in previous Cameroon YFTC assessments, which have provided elements useful in the development of the present study's methodology. The second section describes the methodology used in this study.

Evaluation of African Agricultural Training and Extension Programs

Comparative Sample Surveys

One very thorough way to evaluate the impact of an agricultural training or extension program is to compare the changes over time experienced by two groups, one having received training and the other not, (Hatry, Winnie, and Fisk, 1973, pp. 56ff). This is the method used to evaluate some Indian "training and visit" extension systems (Cernea and Tepping, 1977, p.16) as well as to evaluate a Tanzanian FTC (Francke, 1974). This "experimental" method is very demanding of time and resources. First, it requires the collection of

relevant baseline data on both groups before one enters the training program. Second, it requires an extended time commitment by an analyst or a monitoring unit, since enough time must pass, following baseline data collection and training, for the trainees to have had the chance to put into practice what they learned in training. Third, it can be costly because it requires data collection at two different times. Two other evaluation methods, the "before/after" and "with/without" methods, adapt the experimental method to the constraints of cost and time.

Before/After. It is possible to gather data on a single sample--the trainees--in two different periods, one preceding training and one following it. The before/after method is valid only to the extent that there are no factors extraneous to the training program which could lead to measured before/after differences regardless of the effect of training. Ascroft, et al. (1973) and Schonherr and Mbugua (1974) used this method to evaluate the impact of agricultural training on non-progressive farmers in Kenya and Tanzania.

Several evaluations of the Cameroon YFTC program have used the before/after method[1] (Meka-Engamba, 1978; USAID, 1976; Cameroon, Benefices Economiques, 1978). However, three extraneous intervening factors may compromise evaluations based on before/after data from the YFTC program.

First, the establishment of the Dadjamka CFJA coincides with the creation of Sodecoton and the intensification of cotton farming. Before/after changes noticed in early

groups of trainees may therefore be attributed not to the YFTC training, but to the inputs and technical advice provided by Sodecoton. In particular, changes in yields and in total production of foodcrops may be due in part to the residual effects of cotton fertilizer on subsequent food crops.

Second, animal traction is widely available in the Dadjamka area, and somewhat available in the Goyang area. It is likely that even in the absence of YFTC training a certain proportion of trainees would have acquired animal traction on their own. Therefore, not all the before/after production changes due to animal traction can be attributed to the work of the YFTC program.

Finally, the YFTC trainees are young couples. It is possible that in the several years between "before" and "after" production measurements, their families have grown enough to warrant increased food production. Such increased production would not be attributable to YFTC training but rather to the demands of the family life cycle.

A variant of the before/after method is to gather data on trainees only after their training program and to ask them at this time about their situation before training. This is the method used by Honeybone and Marter (1975) for the Zambian FTCs and by Samatana (1980) and by Agbor-Tabi (1981) to evaluate the Cameroon YFTC program. The method poses two problems: accuracy of recall, and bias. The studies by Samatana and by Honeybone and Marter concentrate on fairly

important practices centered on adoption of hybrid corn and of animal traction. These are events which happen only once for any respondent, and which do not require measurement, so they are not difficult to remember. Accurate recall poses a problem, however, when respondents are asked to remember annual income, production, or storage loss, since these require measurement and can vary from year to year. Agbor-Tabi sought responses concerning annual production and storage loss for the year preceding training. It would be unwise to assume a high degree of accuracy for the responses to these questions. In these "after" studies there is a danger that farmers might have biased their responses concerning time of adoption, either to make themselves look more progressive, or the FTC program more important, than is really the case.

With/Without. A second adaptation of the experimental method, often used when no baseline data exist, is to gather data only after training on two samples, one trained, one untrained. Petrini (1973) evaluated Tanzanian FTCs using this method. Chaudhri (1979) and Lockheed et al. (1980) also used the method in their studies of the economic value of education in the aggregate in developing countries. The with/without method is valid to the extent that the two samples are similar in all relevant respects except that one has been trained. That is, neither sample before training differed in any of those characteristics which could affect the variables measured after training.

Since there are no baseline data in with/without evaluations, it is of course quite difficult to verify such similarity in the two samples. The with/without studies by Chaudhri (1979) for India, and Lockheed et al. (1980), for a number of developing countries, provide examples of the possible dangers in analysis of the value of education based on data sets with no baseline data. Both studies use production functions for agricultural output in which education and agricultural training are productive inputs. However, neither study contains information on some other important productive inputs which should enter the production function. Chaudhri does not include land quality in his production function. Lockheed et al. include neither land quality nor, in some cases, the use of irrigation or fertilizer. It may be that the education and agricultural training provided in developing countries do not increase agricultural production. They may be only proxies for possession of high quality land, and for use of irrigation and fertilizer. If this is the case, then it is possible that with/without analysis of the value of education and agricultural training would appear to show their positive effect on production; but the appearance would result from a failure to include other productive inputs, with which education and training were correlated, in the analysis.

Despite this major problem of the with/without method, it is often the only feasible method for quantitative analysis of the effects of agricultural training in the absence of

baseline data. One way to reduce the dangers of exaggerating the productive effects of agricultural training is to gather data on all variables which may increase production. This will permit analysis to separate the effects of education from those of other productive inputs with which it may be correlated.

Training and Material Inputs. All the methods so far discussed pose an additional problem when training or extension are accompanied by farm credit, fertilizer, equipment, or other inputs. It is of interest to know what training and extension alone contribute to production in the presence of new productive inputs. If the contribution of training is sufficiently low, it would make more sense to simply provide farmers with the inputs without allocating resources to low-return training. However, many evaluations of training and extension programs beg this question by considering training and the new inputs as a single "bundle" of inputs contributing to production in fixed proportions. This prevents assessment of the real value of training.

For example, Ascroft et al. (1973) and Schonherr and Mbugua (1974) claimed that training of non-progressive farmers was valuable because following training large percentages of them successfully grew hybrid corn. But since the training program provided them with hybrid seed and fertilizer, it is not in fact possible to assess the contribution of training alone to the behavior and to the production of these non-progressive farmers.

The same problem exists among assessments of the Cameroon YFTC program which treat it as a "package" of equipment-provision and training in fixed proportions. (Meka-Engamba, 1978; USAID, 1976; Cameroon, Benefices Economiques, 1978). If properly done such assessments can tell us the value of the program in its entirety, but cannot tell us the value of the program's training component.

Other Evaluation Methods

There are several other ways of evaluating training and extension programs which require less rigorous sampling procedures. Such methods can provide information about the training program which can not be obtained by the methods described earlier. These methods are concerned with farmer attitudes towards a training or extension program, farmer contacts with the program, and diffusion of new techniques to farmers not directly affected by the program.

Farmer Attitudes. Farmers can be asked their opinion about various aspects of the training or extension program. This was a key to the approach taken by Lefebvre and Lefebvre (1974) in evaluating the impact of FTCs in Senegal and in Chad. It was also one part of the Cameroon YFTC evaluations done by Kamajou and Gow (1979), Samatana (1980), and Pahai (1975). This approach can be extremely bias-prone when farmers perceive it not in their interest to give their real opinion about a training or extension program. Kamajou and

Gow explicitly recognized the problem of bias (p.7). Pahai did not, but the phrasing of farmers' responses to some of his questions lead one to suspect the presence of bias.

When problems of bias are limited, this method can provide much valuable information which would not be collected in interviews concerning only agricultural practices and production. The study by Lefebvre and Lefebvre provides interesting information based on this method. Farmers were well-accustomed to being asked their opinion, since the FTCs being evaluated actively sought farmers input into training (Lefebvre and Lefebvre, 1974, p.12). Also, the evaluators sought out the most outspoken farmers (p.3).

Farmer Contacts. Looking at contacts between farmers and a training or extension program can be important only in measuring the potential impact of the program. In measuring the extent of such contacts it must be remembered that contact does not necessarily lead to adoption of new techniques or to increased production unless the techniques are appropriate to on-farm conditions. Therefore, while this approach is valuable, it is also incomplete.

Farmers themselves can be questioned concerning their contacts with the training or extension program. Hulls (1971) and Ascroft et al. (1969) have used this method to evaluate extension coverage of farming populations. On the other hand, extension agents or FTC staff can be asked about their contacts with farmers. This is the approach of Saylor (1970) and Leonard (1977).

Diffusion of New Techniques. When one objective of training is to provide trainees with skills and knowledge which they will impart to their neighbors, it is important to assess the effect of diffusion of the skills and knowledge from trainees to non-trainees. Such an assessment can be obtained by asking program participants how many non-participants they contacted and what the results of such contacts were (Ascroft et al.,1973; Schonherr and Mbugua, 1974). It may be difficult to verify the responses, however. The extent of diffusion can also be assessed by asking non-participants what they have learned from the trainees.

Both of these approaches to the diffusion question are fraught with bias; this is particularly true of one-shot interviews in rural Africa. A trainee may exaggerate his impact as a diffuser in the hopes of being rewarded with another training session or perhaps some fertilizer or seed. (On the other hand, a trainee may not be aware of all the farmers who he has influenced by example).

A non-trainee, if asked by an outsider what his contacts with a trainee are, may also exaggerate the trainee's role. He may perceive the interviewer as someone sent to check-up on the trainees in their villages. In this case, he may want to make sure that the outsider goes away with the impression that the trainee is "doing his job".

Problems of bias in the responses of African farmers to interviewers (whether national civil servants or expatriates)

is a function of the minimal level of understanding that farmers and the administration have of each others' goals and ways of operating. What appears to farmers as frequent capricious disruption of village affairs by the authorities often leads them to be extremely circumspect in their dealings with outsiders. Such considerations, while not empirically verifiable, are more than speculation. They must be taken into account when designing questionnaires to assess second-order diffusion effects of any training or extension program in Africa.

The various methods discussed in this section have all been used in elaborating the survey instruments for this study, and the problems attendant on each method have been minimized as much as possible.

Methodology for the Present Study

This section describes the sampling procedure and survey instruments used to assess the impact of the YFTC program. Sample design is presented in tabular form on Table 4.1; details concerning methods of data analysis are given in Annex A. The research methodology uses a number of the evaluation techniques previously described. The originality of the methodology derives from its combination in a single study of "with/without" comparative techniques, analysis of the diffusion of agricultural innovations, and concern with the productive effects of such innovations. The evaluation

took place in the areas surround the two oldest YFTCs, in Goyang and Dadjamka. It is based on assessment of three different aspects of the YFTC program. The "training effect," the program's impact on trainees, is assessed by comparing a group of trainees to one of non-trainees. The "diffusion effect," the program's impact on trainees' neighbors, is assessed by looking at a second group of non-trainees. The role of the YFTC as a development center is assessed on the basis of information provided by all three groups.

The household was the unit of analysis because it is young households, and not individuals, that are trained at the YFTCs.[2] Data collection by interview proceeded in three stages, each stage done by a different interviewer. Parts of the survey were conducted in both the Dadjamka and Goyang areas.

Sample Design

Sample Design for the Training Effect. Twenty-seven trainees in the Dadjamka area were compared to 18 non-trainees. Eighteen of the trainees selected came from one of the earliest classes because it was important for the survey to assess the effect of training on trainees who had had enough time since training to really master the skills that they had learned and to use these skills on their own farms. Since the evaluation was concerned with production, it was also important to choose trainees in villages where crops had not been seriously

damaged by heavy flooding in the cropping season preceding the survey. These two considerations led to the selection of the second class from the Dadjamka YFTC, the 1975-76 class. Of the twenty original trainees in the class, two had died leaving 18 trainees living in five villages.

It became necessary during the evaluation to add more trainees to the sample. The 1975-76 class, it turned out, had not received weeders and ridgers. Since a major goal of the survey was to assess trainee use of animal traction technology, nine other trainees who had received these implements were chosen. These nine were from the 1978-79 class, and lived in two villages very close to the five original villages.

It was crucial for the non-trainee sample to have had no contact with the trainee sample in order to insure that measured differences between trainees and non-trainees were indicative of the results of YFTC training and not of non-trainees' increasing their production by copying some of the new techniques used by trainees. Therefore, the non-trainee sample for the training effect was chosen in an area with no trainees. Also, non-trainees' lack of meaningful contact with trainees was verified in the non-trainee interviews.

The non-trainee sample was intended to be as similar to the trainee sample as possible. One non-trainee village was paired with each of the five trainee villages on the basis of the following similarities with the trainee villages:

proximity to Doukoula; access to local village markets; and minimal crop damage from flooding.

Non-trainee households in the five non-trainee villages were chosen on the basis of the following criteria: the household heads were approximately the same age as trainees;[3] they had been married, like the trainees, for at least five years; they grew cotton for Sodecoton; and they had animal traction equipment. By comparing trainees to non-trainees who were also equipped with animal traction, it was hoped that the value of training itself could be isolated from the value of equipment provision.[4]

Trainees are self-selected in the sense that they volunteer for the training program. Assessment of the training effect based on comparison of a self-selected group (trainees) with a randomly selected group (non-trainees) could be misleading if the same factors influencing self-selection also influence variables being measured in the assessment. However, since non-trainees are randomly selected from a population of farmers who have similar equipment to that of trainees, the problem is minimized. A primary motivation of trainees to attend the YFTC is to get equipment and a pair of oxen; this is therefore a crucial factor in their self-selection. Farmers in the non-trainee sample have never had the chance to self-select for YFTC training, since the YFTC has not yet recruited in their villages. But they have had similar motivation in that they have had to actively

seek out a source of animal traction and oxen and have made an important investment to acquire them. Non-trainees invest income in a down payment, while trainees invest a year of foregone income at the training center. It is likely that the motivating factors for self-selection among trainees are similar to those among non-trainees who are equipped with animal traction.

YFTC staff and the chiefs of each of the five non-trainee villages developed a sample frame of all household heads meeting the criteria outlined above. Random samples were drawn in each village, proportional to the size of the village's sample frame. The overall sample size was 18.[5]

The coordinator of women's training wanted to assess the impact of women's training in the Goyang area. She had very limited time, however, and interviewed only nine trainees. She interviewed no group of non-trainees without trainee contact.

Sample Design for the Diffusion Effect. Evaluation of the diffusion effect was based on a sample of fifty non-trainees in the Goyang area and forty in the Dadjamka area. Two village selection strategies were possible in assessing the diffusion effect. A small number of villages could be chosen, and many non-trainees interviewed in each village. This would permit an in-depth understanding of the diffusion process in those villages, but there would be no way of knowing if the few villages selected were representative of most villages in the area. On the other hand, a larger number

of villages could be selected, and fewer non-trainees interviewed in each village. This would increase the chances of representativeness, but would sacrifice in-depth knowledge of intra-village communication.

This second course was followed because program planners and donors had absolutely no information on the diffusion effect. Under these circumstances, in-depth but unrepresentative analysis of the diffusion effect in one or two villages could be quite misleading, whereas a more representative analysis of a few gross indicators of the diffusion effect could be quite useful to program planners.

Three of the five villages inhabited by the 1975-76 class of trainees were chosen in the Dadjamka area; five were chosen in the Goyang area. It was thought that conducting the diffusion survey in eight villages would economize on administrative time (contacts with the chief, travel, drawing up sample frames) while at the same time providing a representative sample of villages.

The household is the basic agricultural production unit, and it is primarily married people who are farm decision-makers (Guillard, 1965, p.195). Therefore, it was thought likely that the diffusion effect would be greatest among married non-trainees. It was also assumed that old people would be less likely to adopt new cultural techniques than younger people. Finally, the staffs of the RCC and of the YFTC's believed that some of the techniques taught to trainees could be diffused to non-trainees even when they did not have access

to animal traction. Thus, the sample frame for assessment of the diffusion effect included households where the household head was under 45 years of age (Dadjamka) or under 50 (Goyang).

RCC and YFTC staff, in collaboration with village chiefs, developed sample frames according to these criteria in the eight villages chosen for assessment of the diffusion effect. Random samples were drawn in each village. In the Goyang survey, sample size was the same in each village, for ease of sample selection; sampling in the Dadjamka survey was approximately proportional to the size of the sample frame in each village.

Role of the YFTC as a Development Center. Assessment of the YFTC's role as a development center was based on data gathered in the Dadjamka area from the trainee sample and the two non-trainee samples, and in the Goyang area from the non-trainee sample. The assessment was also based on personal observation and on informal interviews with representatives of various local government agencies.

Survey Instruments

Three different interviews were administered, each by a different person, in order to optimize the use of the time and skills of all participants in the evaluation. The first interview concerned family composition and household possessions; the second concerned agricultural production and

practices, as well as contacts with other farmers and with government agencies. The third concerned family health and nutrition and female activities. Not all interviews took place with all respondents.

Demographic Interview. The questionnaire for this interview was tested and modified in September 1980 with the Dadjamka YFTC staff. It was adminstered, only in the Dadjamka area, to household heads by YFTC staff from November 1980 to February 1981.

Agricultural Interview. Questionnaires were tested and substantially modified in September 1980 and January 1981 in collaboration with staff from the RCC and the YFTCs in Dadjamka and Goyang. The interview was administered to household heads from all samples (except for the nine trainees in the Goyang area) from January to March 1981. The author and a local interpreter administered the interview in the Dadjamka area; in the Goyang area, interviews were conducted by RCC and YFTC staff.

The questionnaire modifications were intended to minimize bias for those questions concerning contacts with trainees and attitudes towards the YFTC. They were also intended to maximize the accuracy of production data.

There was a serious concern with the possibility of biased responses to questions which asked non-trainees about their contacts with trainees, specifically about new practices that non-trainees may have adopted due to trainee advice or example. These problems of bias were dealt with by asking a

series of questions for the two most likely practices to be diffused from trainees to non-trainees (row-seeding and use of improved varieties). Each series of questions was structured to include a cross-check on validity of responses and to minimize the possibility that the interview would be perceived as "checking up" on the activities of trainees in the village (and thereby minimize the possibility of responses biased in order to put the trainees in a favorable light).

There was also a concern that trainees themselves would bias responses to questions about their opinion of the training program. During questionnaire testing, responses to such questions were consistently on the order of, "the length of training was just right," "the program was very good for me," "I have no opinion on how to improve training; you should really ask the YFTC staff all about that". No reformulation of questions or restructuring of the questionnaire was able to elicit more useful, more specific responses, so this series of questions was not included in the final questionnaire.

The limited resources available permitted collection of production data on one field from households in the Dadjamka area, but did not permit collection of labor data or of whole farm production information. RCC staff believed that no significant training effects would be seen on the cotton fields, since both trainees and non-trainees receive close supervision and the same inputs from Sodecoton. And since the YFTCs do not teach any productivity-increasing techniques for dry season sorghum, it was decided to choose the most important

rainy season foodcrop, which is short cycle red sorghum, Sorghum caudatum var caudatum. Since the interview was conducted with the head of household, questions concerning red sorghum production were asked only if he grew some red sorghum (not if his wives alone had their own personal fields).

Because intercropping is widely practiced with red sorghum, production data on all intercrops in the red sorghum field were also collected. Data collection proceeded in five steps:

1. Recall of amount of red sorghum taken from field during the "hungry season" before the harvest.
2. Conversion of this amount to 90-kilogram sack equivalents.[6]
3. Recall of red sorghum harvest.
4. Conversion to 90-kilogram sack equivalents.
5. Recall of harvest of intercrops in local units of measure.

Before each step in this process, the respondent was asked if he would be able to perform that step (e.g., the question "Do you remember how much sorghum you and your family gathered before the harvest?" preceded step 1). Large numbers of respondents were unable to perform all five steps. Data was analyzed only from the 29 respondents (out of a total of 85 in the three Dadjamka samples) who successfully performed all five steps. To increase the data base on agricultural production, 10 more non-trainees in one diffusion-sample village were interviewed. Four of them successfully

performed all five steps, and their production data was then added to the rest of the production data.

Red sorghum fields of those 33 respondents who had good recall were measured for area using a compass, a tape measure and a T158C calculator programmed to calculate area from length and compass bearing.

Doukoula retail prices for intercrops measured in local units, and wholesale prices for sorghum in sacks were obtained by the survey interpreter. Total production of all crops on the red sorghum field was then converted into value terms and standardized in terms of value per hectare.

In the Goyang area, no production data was gathered. However, density was measured on one sorghum or millet field from each household.

Women's Interview. The questionnaire for the women's survey was designed with the RCC's coordinator of women's activities and tested by her and the two female trainers in January 1981. The interview was administered by the RCC women's coordinator and the female trainers from the Dadjamka and the Goyang YFTCs from January to March 1980. The interview was conducted with the trainee samples from Dadjamka and Goyang, and with the non-trainee training effect sample in the Dadjamka area. It was also conducted with a small part of the non-trainee diffusion samples of both Dadjamka and Goyang.

In those non-trainee households with more than one wife, the interview was conducted with the wife closest in age to an average female trainee from the 1975-76 class.

Summary

This chapter has discussed a number of evaluation methods used in past studies of the YFTC program and of other extension and training programs. These methods include with/without sample surveys, interviews with farmers concerning their contacts with agricultural services, observation of the diffusion of new techniques, and questioning farmers about their attitudes towards a training program. All of these techniques were used in developing a method to assess the impact of the YFTC program.

Three different aspects of the YFTC program are evaluated: the training effect, the diffusion effect, and the role of the YFTC as a local development center. The training effect was assessed by comparing a sample of trainees to a similar sample of non-trainees with no contact with the trainees. Assessment of the diffusion effect was based on a sample of non-trainees living in trainee villages. The role of the YFTC was assessed on the basis of data from all these samples.

Three interviews were conducted: a demographic interview; an interview concerned with agriculture and with contacts with other farmers and agriculture services; and a women's interview. Table 4.1 summarizes this chapter.

TABLE 4.1 SAMPLE DESIGN AND INTERVIEW SCHEDULE

	DADJAMKA SURVEY			GOYANG SURVEY	
SAMPLE	1.TRAINEES	2.NON-TRAINEES IN NON-TRAINEE VILLAGES	3. NON-TRAINEES IN TRAINEE VILLAGES	4. NON-TRAINEES IN TRAINEE VILLAGES	5.TRAINEES
Purpose	Measure training effect	Measure training effect	Measure diffusion effect	Measure diffusion effect	Measure training effect
N=	27	18	40	50	9
Number of villages	7	5	3	5	2
Criteria for village selection	-Inhabited by some of earliest trainees -Suffered little flooding damage in 1980	Similar to trainee villages: -Comparable population -Similar market access -Suffered little flooding damage in 1980	-Inhabited by Sample #1	-Inhabited by some trainees	-Inhabited by Sample 4
Criteria for Inclusion in Sample Frame	-Entire 1975-76 Class (18) -Half of 1978-79 Class (9)	Similar to trainees: -Married for at least 5 years -Less than 45 years old -Equippped with animal traction -Work with Sodecoton	-Married -Less than 45 years old	-Married -Less than 50 years old	-Live in villages of Sample 4
Sampling Method	Census	random	random	random	purposive
Demographic Interview	Yes (with 18 from 1975-76 class)	Yes	Yes	No	No
Interview on Production and Professional Contacts	Yes	Yes	Yes (with 30)	Yes	No
Women's Interview	Yes (with 17 from 1975-76 class)	Yes (with 16)	Yes (with 6)	Yes (with 9)	Yes
Yield Data For Red Sorghum	Yes (with 12)	Yes (with 5)	Yes (with 12) (also with 4 others not in sample)	No	No

ENDNOTES FOR CHAPTER FOUR

[1]The recruitment process provides production and demographic pre-training data on all applicants, thereby providing an easily accessible data base for before/after comparisons. However, data quality, particularly concerning production, leaves much to be desired.

[2]Research in the area of Dadjamka does not present the same difficulties in disentangling the decision-making patterns of households as are encountered elsewhere in Africa. This is because due to Toupouri spacial and marital patterns, compounds are occupied only by nuclear families (albeit sometimes polygamous) (Guillard, 1965, p. 130; confirmed by Dadjamka YFTC staff).

[3]In fact, they turned out to be on average two years older than the trainees.

[4]None of the non-trainees had weeders or ridgers, however.

[5]Original sample size was 19, but data from one household was not used in the analysis when it was discovered that the household head had been a trainee at the Langui Civic Center. Since the value of the YFTC training was being compared to a without-training situation, inclusion of a participant from a different training program would have been inappropriate.

[6]90-kilogram sacks are widely used for purchase and sale of sorghum by farmers in the Dadjamka area.

CHAPTER FIVE

ASSESSMENT OF THE TRAINING EFFECT

This chapter describes the effect of YFTC training on trainees' behavior in the Dadjamka area; this "training effect" is assessed by comparing the behavior of trainees to that of non-trainees who had no contact with trainees. Based on discussions with RCC and YFTC staff in September 1980, it was decided that the following types of behavior would best reflect the training effect: care of work oxen and equipment; adoption of some crop husbandry practices taught at the YFTC; and health and home economics behavior. Specific practices taught are outlined in Table 5.1. For some variables there was no information on non-trainees. In these cases, which are noted in the text, no comparison is made, but trainee behavior is nonetheless described.

Many of the variables discussed in this chapter are dichotomous variables which have only "yes" or "no" values. They can indicate whether or not something has been done, but not how well or in what degree it has been done. Dichotomous variables are good indicators of the extent of adoption of new techniques, but they are not useful in distinguishing subtle differences between trainees and non-trainees. For

TABLE 5.1: PRACTICES TAUGHT AT THE YFTC

Care of work oxen and equipment
Animal nutrition*
Castration *
Animal training
Agronomic practices
Plowing
Seeding in rows*
Planting in sole stands
Weeding with animal traction*
Ridging*
Crop rotations
Other farming practices
Use of chemicals for seed treatment and storage
Use of certified seed for food crops*
Health and child care practices
Adequate care of children with malaria
Adequate care of children with diarrhea*
Adequate prenatal care
Bathing infants with soap and warm water*
Bathing infants' drinking water*
Preparation of easily digestible meals for infants
Home economics knowledge and practices
Improvement in compound*
Know how to prepare nutrition meal*
Budgeted for purchases to improve health or income*
Purchase of mosquito nets*
Invested in children's education

*Adopted by trainees as a result of YFTC training.

example, all that is known about plowing is who plowed and who did not. Information on depth and timeliness of plowing was not gathered because such information requires the respondent to remember a specific measurement or time which is different each year; it is therefore difficult to obtain accurate recall of such information. Analysis of the training effect in this chapter may therefore not elucidate subtle differences in trainees' and non-trainees' behavior which are important to agricultural production.

Due to the extremely limited number of trainees (12) and non-trainees with no trainee contact (5) who were able to provide accurate production data, it was impossible to compare differences in the agricultural production of trainees and non-trainees. Sixteen other non-trainees provided accurate production information, but because they lived in the same villages as trainees their production data could not be used to assess the training effect.[1] Although the contribution of training to trainees' production could not be analyzed, the productive effect of some cultural practices taught at the YFTC was analyzed by adding data from these sixteen non-trainees to that from the twelve trainees and the five other non-trainees. This provided an adequate data base for the analysis of productivity of various cultural practices and for an assessment of the YFTC technical package.

Many of the results presented in this chapter would not be found in the areas surrounding other YFTCs in North Cameroon. The control of land by the Toupouri people in the

Dadjamka area, their history as cattle raisers, and their previous animal traction experience all have important implications for the effect of YFTC training on their agricultural practices.

Care of Work Oxen and Equipment

Because YFTC training is focused on animal traction, good care of work oxen and equipment are crucial to a trainee's success in adopting other agricultural practices which depend on animal traction. Nutrition, castration, and ox training were analyzed because they are among the most important and easily verifiable sets of practices.

YFTC staff encourage trainees to buy salt and cottonseed cake for their oxen during the dry season in order to insure that they have the strength to plow when the dry season ends. Evidence from the survey indicates that the YFTC program contributes to good animal nutrition by trainees, since 95 percent of trainees provide nutritious rations to their oxen, compared to only 77 percent of non-trainees. However, the effect of training is limited since a large percentage of non-trainees also provide their oxen with nutritious rations.

The YFTC teaches farmers to train their oxen slowly, first insuring that the animals are comfortable with the yoke alone, then with increasing weight behind them, before they are used for plowing. There is no training effect for adoption of this step-by-step method to train work oxen.

The absence of any contribution by the YFTC to the way farmers train oxen, and its limited contribution to improving animal nutrition, are due to the fact that most trainees had adopted these practices before they even entered the YFTC. For example, 88 percent of trainees had trained oxen using the step-by-step method before the Dadjamka YFTC was ever built. The Dadjamka YFTC is training farmers in practices which they already use, since the Toupouri people in the area are cattle-raisers of long standing and have twenty years of experience with animal traction.[2] It is likely that in other areas where animal traction is less widely used there is a much greater contribution made by YFTC training to adoption of good animal care practices.

Castration is recommended by the YFTC to make animals more docile and to increase weight gain. Evidence from this survey suggests a tendency for more trainees (32 percent) than non-trainees (21 percent) to castrate their work animals. But even among trainees, two-thirds did not castrate. Reluctance on the part of most trainees and non-trainees to castrate their animals may reflect the need of many households for stud bulls in their cow herds. This may be a problem unique to the Dadjamka area where so many households have their own herds. Reluctance to castrate may also indicate a high cost to castration by the veterinary service. Whatever the cause, one result of non-castration may be that the toolbars received by trainees at the YFTC are not used for plowing; many of them are either in storage or used as

TABLE 5.2 CARE OF WORK OXEN AND EQUIPMENT

Behavior	% Trainees	% Non-Trainees
Provided nutritious ration to oxen in dry season*	95	77
Had oxen castrated	32	21
Learned to train oxen by step-by-step method since the establishment of the YFTC	8	12
Had equipment repaired when it was broken	100	100

*Difference significant at .10 level

spare parts. During the training program, trainees use the toolbar with the YFTC's animals, which are large and strong enough to pull it. However, 70 percent of the trainees do not use the toolbar for plowing with their own animals in their villages. It is likely that the weight gain resulting from castration at a sufficiently young age would increase the capacity of trainees' oxen to work with the toolbar.[3]

Agronomic Practices

Sorghum is the staple crop grown in the Dadjamka area. There are several varieties, some grown in the rainy season, others in the dry season. Rainy season sorghum varieties are often planted in mixtures with millet, cowpeas, gourds, squash or sesame. A serious constraint on increasing sorghum production is widespread infestation by the weed striga (Striga hermonthices, "witchweed"). Some sorghum fields are planted to sorghum year after year with no fallowing and no rotations; soil fertility is maintained by manuring. Other sorghum fields are part of the cotton/sorghum rotation encouraged by Sodecoton. Cotton is always planted in rows and sole stands under Sodecoton's close supervision. Many households have cattle which browse on sorghum and millet stalks after harvest, which are fed hay, and which provide manure, milk, and sometimes animal power.

Limitations of time and resources permitted in-depth study of only one enterprise. For reasons detailed in

Chapter 4, the rainy season red sorghum enterprise was chosen for study. Practices taught at the YFTC for red sorghum include plowing, row-seeding in sole stands, weeding with animal traction, ridging and crop rotations.

As assessment of the feasibility and the productive value of agronomic practices taught at the YFTC and of those used traditionally by farmers is important for understanding trainees' adoption of some YFTC recommendations and rejection of others. For each recommended agronomic practice, this section first evaluates its feasibility before discussing the extent of trainee adoption of the practice. An assessment of the feasibility of some of these practices was made on the basis of information from the 33 cases in the Dadjamka area who provided data on red sorghum production. Multiple regression analysis was used to isolate the individual effects of plowing, row-seeding, intercropping, and manuring on production per hectare. Production of red sorghum and intercrops on the red sorghum field was standardized by measuring production per hectare in terms of value in CFA francs. Only returns to land were analyzed. Time did not permit collection of data needed to calculate returns to labor.

In addition to variables for various cultural practices, two variables which indicated degree of flooding on the field were added because these increased the explanatory power of the regression. Two regressions, shown in Table 5.3, were run. In Regression 1 all independent variables were dichotomous, including INTERCROP 1 for which a value of 1 indicated

TABLE 5.3: REGRESSION COEFFICIENTS FOR CULTURAL PRACTICES

(1) PRODUCTION IN CFA/HA	= 29416	- 23797	PLOW	+ 15975	ROWSEED	+ 24157	MANURE	+ 13530	INTERCROP 1
(Significance)	(.007)	(.01)		(.06)		(.01)		(.16)	
	-12925	MINOR FLOOD		- 22617	MUCH FLOOD				
		(.16)			(.07)				
	Regression Significance = .005			$\bar{R}^2$ = .40					
(2) PRODUCTION IN CFA/HA	=35243	- 20608	PLOW +	13016	ROWSEED	+ 20398	MANURE	+ 262	INTERCROP 2
(Significance)	(.000)	(.04)		(.10)		(.06)		(.18)	
	-9817	MINOR FLOOD = 18638		MUCH FLOOD					
		(.31)		(.11)					
	Regression Significance = .006			$\bar{R}^2$ = .40					

the presence of other crops on the red sorghum field and a value of 0 indicated red sorghum planted in sole stands. In Regression 2, all independent variables were dichotomous except INTERCROP 2, which is a continuous variable indicating the percentage of total value of production per hectare due to intercrops rather than to red sorghum. (The coefficient of INTERCROP 2 indicates the change in production due to a one percentage point increase in intercrops on the field). Each regression was run under five different sets of assumptions concerning error in measurement and in pricing. Results of all the analyses are quite similar, as discussed in Annex B. Table 5.3 presents only the analyses with the greatest explanatory power.

Plowing

Evidence from other parts of Africa suggests that plowing increases returns to land by increasing water infiltration (Charteau and Nicou, 1971, p.935). However, Regressions 1 and 2 indicate that plowing reduces the returns to land for red sorghum. The negative coefficients for plowing have two possible explanations. Many farmers claimed that minimum tillage on the red sorghum field greatly inhibited the growth of striga hermonthica (witchweed), and that they therefore avoided plowing this field. If farmers' perceptions are correct, then in the case of red sorghum plowing is correlated with striga and with the resulting decrease in production.

The other explanation for the negative plowing coefficients is that plowing is a proxy for something else. Many farmers who want to plant red sorghum on a field where cotton was grown the year before do not plow the field. In such cases, the absence of plowing would be correlated with the existence of residual cotton fertilizer, and could therefore be expected to accompany high production. Plowing would be correlated with the absence of residual fertilizer and would therefore appear to decrease production. Because the survey gathered no information on use of the red sorghum field during the previous cropping season, it is impossible to control for residual cotton fertilizer and thereby to assess the real effect of plowing on production of red sorghum and intercrops.

Adoption rates were calculated only for plowing the red sorghum field, since plowing the cotton field is encouraged by Sodecoton and is done by the vast majority of Toupouri farmers. Sixty-two percent of trainees plowed their sorghum field, compared to 63 percent of non-trainees. However, the effect of training on plowing the red sorghum field cannot be assessed from this data. This is because, contrary to the intent of the sample design, the trainee and non-trainee samples were not equally equipped. While only non-trainees with oxen and animal traction equipment were selected for this part of the study, many trainees no longer had the oxen they received at the end of their training program. Eleven percent of trainees had no oxen, and 56 percent had only one.[4]

Planting Food Crops in Rows With No Intercrops

Row-seeding of red sorghum, recommended by the YFTC, may increase returns to land on the red sorghum field, according to results of Regressions 1 and 2. The YFTC also recommends planting red sorghum in sole stands; however, it is intercropping rather than sole-cropping which appears to increase returns to land, although the regression coefficients are not very statistically significant. Evidence on intercropping elsewhere in Africa confirms these results, and indicates that intercropping also increases returns to labor (Norman, Prior, and Gibbs, 1979, pp. 59 ff) and reduces risk (Belshaw and Hall, 1972, p.56).

The effect of training on adoption of these practices indicates that trainees may be adopting those recommended practices which are productive while rejecting unproductive ones. Training appears to have an important effect on the adoption of row-seeding, since the difference in adoption rates between trainees and non-trainees is substantial (56 percent vs. 40 percent) and statistically significant. But training appears to have no effect on the adoption of sole-cropping, as shown in Table 5.4. In fact, many more non-trainees than trainees plant their red sorghum in sole stands, although the difference is not very statistically significant.

The YFTC and the agricultural posts recommend certain densities for red sorghum. RCC research around Goyang has

TABLE 5.4: ADOPTION OF ROW-SEEDING AND SOLE-CROPPING ON THE RED SORGHUM FIELD

Agricultural Practice	% Trainees	% Non-Trainees
Row-Seed*	56	40
Sole-Crop	13	38
Sole Crop and Row Seed	13	13

*Differences significant at .10 level

shown that even among farmers seeding in rows densities are much lower than recommended. Around Dadjamka, YFTC staff also believe densities to be lower than recommended. It is not unexpected that farmers who plant their food crops in mixtures seed their red sorghum at densities below those recommended for sole stands, since red sorghum must share soil nutrients with other crops in the mixture.

Results from this study indicate that the Dadjamka YFTC's seeding recommendations need to be reconsidered in order for them to better suit conditions faced by farmers. Under existing circumstances it is inappropriate for the YFTC to recommend seeding in sole stands. It is possible that crop mixtures currently used by farmers could be improved on to increase returns to land and labor. It is such improvements on intercropping patterns, at individual crop densities appropriate to crop mixtures, which the YFTC needs to teach to trainees.

Weeding and Ridging

The productivity of weeding and ridging was not analyzed because only nine trainees and no non-trainees had the required equipment. Trainees make good use of their weeding and ridging equipment on the cotton field, much better use than on the red sorghum field, as seen in Table 5.5.[5] Cotton is always planted in rows, and is therefore easily ridged and weeded. Red sorghum is not planted in rows by 44 percent of

TABLE 5.5: OPERATIONS FOR WHICH ANIMAL TRACTION IS USED

Operation	% Trainees	% Non-Trainees
Red Sorghum:		
Plow	62	63
Weed	11[a]	—[b]
Ridge	33[a]	—[b]
Cotton:		
Weed	56[a]	—[b]
Ridge	100[a]	—[b]

[a]Includes only 9 trainees with toolbars, weeders, and ridgers

[b]Non-trainees have only plows; they do not have toolbars with weeding and ridging attachments. Therefore no comparison of trainees and non-trainees can be made.

trainees, and animal powered ridging and weeding are therefore impossible on their fields. There may also be some difficulty in weeding and ridging when red sorghum is planted in mixtures with some other crops in a field, although some farmers were able to ridge on fields planted in crop mixtures.

Crop Rotations and Manuring

Sixty percent of farmers surveyed in the Dadjamka area have serious soil problems, while 66 percent have cereal fields suffering from infestation by striga. At the YFTC farm soil fertility is maintained, and striga infestation reduced, by a system of crop rotations and fallowing. This rotation and fallow system is taught to trainees. While the system works well on the YFTC farm, there are many trainees who are unable to adopt it on their own farms in their villages for several reasons. High population density and the consequent land constraint make it difficult to respect recommended fallow periods.[6] Also, land use decisions made by Sodecoton agents each year may supercede the individual ownership and decision-making rights of farmers,[7] and thereby make it impossible for some farmers to undertake the rotation they might have planned. Finally, many households grow red sorghum on the same field near their compound year after year, never fallowing but attempting to maintain soil fertility through manuring (Guillard, 1965, p.240).

Manuring is the traditional method used to maintain soil fertility, and both trainees and non-trainees manure

their fields. Results of Regressions 1 and 2 indicate that manuring greatly increases returns to land for the red sorghum field. This may be due to the effect of manure in inhibiting striga infestation, as well as to its fertilizing effects. Manure's impact on striga infestation was brought up by many respondents and is evidenced by a high negative correlation of manuring with serious striga infestation (-.43). This effect of manure on striga is not unexpected, given the close relationship of low soil fertility with infestation by striga hermonthices (as discussed by Parker, Hitchcock, and Ramaiah, 1977).

The benefits of manure are not available to all farmers in the Dadjamka area because many households do not own cattle herds large enough to supply manure to all their fields. Also, despite traditional composting methods, large quantities of manure remain exposed to the air and thereby lose part of their nitrogen through volatilization. The YFTC technical package includes no improved composting methods and ignores the use of manure as an effective traditional method to maintain soil fertility and reduce striga.

Adoption of Other Farming Practices Taught at the YFTC

Two other practices are taught at the YFTC, use of certified seed and use of chemicals for seed treatment and grain storage.

YFTC attendance appears to make an important contribution to trainees' use of certified seed since completion of their course. Forty-eight percent of trainees had planted certified seed for food crops since course completion, compared to only 22 percent of non-trainees in the same time period. The difference is significant at the .10 level. This may be an indication that YFTC training increases farmers' knowledge about improved crop varieties and their desire to seek out such varieties.

According to YFTC staff, chemicals for seed treatment and grain storage are not available in the Dadjamka area. The effect of training on adoption of these chemical treatments was therefore not evaluated.

Health and Home Economics Behavior

Although women work every day on the YFTC farm, their formal training is limited to the subjects of health and home economics; they receive no formal agricultural training. The effect of YFTC attendance on women trainees was assessed by looking at their adoption of those health and home economics practices deemed most important by the program's staff. These include childcare and nutrition practices, as well as household improvement and budgeting. In addition, it was thought that two other indicators of family well-being might reflect the effect of YFTC training on trainees' budgeting and investment decisions. These are the number of mosquito nets

TABLE 5.6: HEALTH AND CHILD CARE PRACTICES

Practice	% Trainees	% Non-Trainees
Adequate care of children with malaria		
(Dadjamka)	79	82
(Goyang)	71	[a]
Adequate care of children with diarrhea		
(Dadjamka)	90	40
(Goyang)	33	[a]
Adequate prenatal care		
(Dadjamka)	50	45
(Goyang)	29	[a]
Bathed infants with soap and warm water		
(Dadjamka)	44	10
(Goyang)	100	[a]
Boiled infants' drinking water		
(Dadjamka)	50	10
(Goyang)	66	[a]
Prepared easily digestible meals for infants		
(Dadjamka)	68	90
(Goyang)	100	[a]

[a]Because there was no sample of non-trainees in the Goyang area who had no contact with the trainees, no comparison of trainees to non-trainees could be made.

purchased by a family, and the educational level of the children in a family. This last variable indicates the willingness of the household to invest in their children's education by sacrificing the income that their children's labor would have produced were they not in school.

The effects of YFTC training on women's health and child care behavior are ambiguous. It appears that YFTC training has improved the care of children with diarrhea, the method of bathing infants, and the quality of infants' drinking water, as shown in Table 5.6. However, the other practices in Table 5.6, which are no less important, show no training effect. Also, practices which are widely adopted by Dadjamka YFTC trainees are not the same as those widely adopted by Goyang YFTC trainees.

There are two possible explanations for the differences between patterns of adoption of health and child care practices by trainees in the Goyang and Dadjamka areas. First, the conditions faced by women in the two areas are different; for example, soap used to bathe children is more easily available in the Goyang area than around Dadjamka. Second, women's training may be done in a piecemeal way at both centers, with some practices ignored by the Goyang training staff but taught by the Dadjamka training staff, and vice versa. The high absentee rate of the women's trainer at Dadjamka, and the low quality of women's training observed there during the study, would lend support to the supposition that women's training at Dadjamka is piecemeal.

TABLE 5.7: HOME ECONOMICS KNOWLEDGE AND PRACTICES

Practice	Trainees	Non-Trainees
Constructed simple improvement in compound		
(Dadjamka)	18%	0%[a]
(Goyang)	11%	—
Knew how to prepare a nutritious meal		
(Dadjamka)	100%	38%[a]
(Goyang)	100%	—
Budgeted for purchases which would improve health or increase income		
(Dadjamka)	77%	50%[a]
(Goyang)	56%	—

[a]Because there was no sample of non-trainees in the Goyang area who had no contact with trainees, no comparison of trainees to non-trainees could be made.

Trainees in the Dadjamka area appear to be more likely than non-trainees to adopt home economics practices which may increase family well-being, according to results shown on Table 5.7. Goyang trainees also appear to have a high adoption rate for improved home economics practices, except for construction of improvements in the compound.

Trainee households purchase more mosquito nets than non-trainee households, and thereby probably improve family health status. Under the assumption that the number of mosquito nets purchased would be a function not only of training but of family size and general economic position, multiple regression analysis was used to isolate the effect of training on mosquito net purchases. Regression 3 was fitted to the data from trainees and non-trainees. Since older men tend to have access to more resources (wives, family labor, and cattle) than younger men, the age of the male head of household was used as a proxy for general economic position. A Chow test showed a significant difference between the regressions for trainees and non-trainees, so two differential slope terms were included as the last two independent variables in Regression 3.

(3) MOSNETS = -3.25 + 5.17 TRAINEE + .13 HEAD AGE

(Significance) (.26) (.032) (.000)

- .03 FAM SIZE - .13 TRAIN (HEAD) + .045 TRAIN (FAM)

(.053) (.28)

R^2 = .41 Regression significance = .001

MOSNETS = Number of mosquito nets purchased since 1976

TRAINEE = dichotomous variable for trainee

HEAD AGE = age of household head

FAM SIZE = family size based on consumer equivalents[8]

TRAIN (HEAD) = slope differential:(TRAINEE) (HEAD AGE)

TRAIN (FAM) = slope differential: (TRAINEE)(FAM SIZE)

Regression 3 permits calculation of mosquito net purchases for an average-sized family. An average trainee family purchases 2 mosquito nets while an average non-trainee family purchases 1.3. When the regression was run again to cover the period since training and up to but not including the granting of the reinstallation subsidy in 1979, the coefficient for TRAINEE was much smaller than in Regression 3 and was not significant. It is only in the period which includes trainees' receipt of the reinstallation subsidy that trainees purchase significantly more mosquito nets than non-trainees.

Differences in the willingness of trainee and non-trainee families to invest in the education of their children were analyzed by looking at boys' educational levels in each group.[9] Trainee families average 1.1 more years of boys' schooling than non-trainee families, according to results of Regression 4. However, the difference is not statistically significant.

(4) BOYSCH = .73 BOYSAGE + 1.1 TRAINEE

(Significance) (.000) (.27)

R^2 = .72 Regression significance = .000

BOYSCH = Total years of schooling of all boys in family

BOYSAGE = Total possible years of schooling for all boys in family

TRAINEE = Dichotomous variable for trainee.

Even a significant difference in boys' educational levels for trainee and non-trainee families would be difficult to attribute solely to training, however. While the training program might convince farmers of the importance of educating their children, the actual decision to educate their children must be in large part a function of family resources available to pay school fees and to bear the cost of child labor foregone in the fields. The reinstallation subsidy allows trainees to incur greater investment costs for education by increasing trainees' incomes.

The reinstallation subsidy increases household income in two ways. First, it pays for part of the animal traction equipment and oxen given to trainees, thus providing them with a source of increased income. Second, it grants them 60,000 CFA francs, the equivalent of 67 percent of Cameroon's average per capita income, to use as they wish. YFTC training in money management concentrates on the importance of budgeting

for purchases such as mosquito nets, shoes, blankets, small animals, and plastic pails. All such items are easily available at the Doukoula market and elsewhere in the area. It is likely that demand for such items is highly income-elastic. In such a case, trainees'better budgeting ability, seen on Table 5.7, and their increased purchase of mosquito nets, may be more a result of increased income due to the reinstallation subsidy, than a result of actual YFTC training in money management.

Summary

The effect of YFTC training in the Dadjamka area was evaluated by examining the care of oxen and equipment, adoption of agricultural practices taught at the YFTC, and health and home economics behavior. Of the eleven agricultural and animal husbandry practices taught, (See Table 5.1), evidence from this study suggests that six were adopted by trainees as a result of YFTC attendance, although only four of the six manifest a substantial training effect. Eleven other health and home economics practices were examined, of which seven appear to be more widely adopted by trainees than by non-trainees in the Dadjamka area as a result of YFTC training.

There is a limited training effect for the care of oxen and equipment. YFTC training adds little to farmers' skills in the care of animals and equipment in the Dadjamka area

since they have worked with both cattle and animal traction for many years. It is likely that YFTCs in most other areas of North Cameroon would show a much greater training effect for animal traction practices, since they train farmers with little or no previous experience with animal traction.

Some agronomic practices taught at the YFTC are widely adopted by trainees and tend to increase yields, while other recommended YFTC practices are not adopted by trainees because they cannot be used under existing on-farm conditions. Traditional crop husbandry practices used by farmers--such as manuring and intercropping--are productive and widely used by trainees, even after training. These techniques could probably be improved by the YFTC, yet the YFTC either ignores or discourages their use. Reliance by the YFTC on an inadequate and inappropriate technical package results in a program with limited impact on trainee's crop husbandry practices. This is particularly disappointing in an area like Dadjamka, where farmers' longstanding experience with cattle and with animal traction could provide a solid foundation for widespread adoption of productive techniques based on animal power which are adapted to local conditions.

The women's training program concentrates on women's role as housewives, rather than as farmers. There is in general a positive training effect in the adoption of health and home economics practices which may increase family well-being. In the case of some home economics practices adoption

may be due to the trainee families' economic position and their receipt of the reinstallation subsidy more than to the acquisition of new knowledge and attitudes at the YFTC.

ENDNOTES FOR CHAPTER FIVE

[1]We cannot consider such non-trainees as representative of the "without-training" situation since some of them may have increased their production due to their contact with trainees. In such a case, the measured training effect on production would be smaller than the true training effect, since true "without-training" production would be less than the measured production of non-trainees.

[2]Within the trainees' own villages, 60 percent of non-trainees have work oxen, of whom 71 percent fed them well in the dry season without trainee advice or contact, and of whom 60 percent trained them following recommended methods even before the YFTC existed.

[3]Weight gain due to early castration is documented by Sargent, 1979, p.7. Increased strength due to weight gain is documented by France, 1974, p.346, and Tjaart Schillhornvanveen; personal communication.

[4]All had received a pair of oxen at the end of YFTC training five years earlier. Between training and the survey, some of these oxen had died and had not yet been replaced.

[5]It would have been useful to compare these results to those of Samatana (1980) for trainees from Goyang. However, his information is not sufficiently disaggregated. He notes only whether trainees plow, ridge or weed but does not explain what practices are done on which fields.

[6]According to the director of the YFTC.

[7]R. James Bingen, personal communication based on informal interviews in the Dadjamka area in September 1979.

[8]Age 16 and over = 1
Ages 10 to 16 = .75
Ages 5 to 10 = .5
Ages 0 to 5 = .2

[9]Each year of secondary school was counted double. Similar analysis was not done for girls' schooling because of the extremely small number of girls, from either sample, who had any schooling.

CHAPTER SIX

ASSESSMENT OF THE DIFFUSION EFFECT

This chapter presents results of the assessment of the diffusion effect, that is, the impact of trainees' diffusion of new techniques to their non-trainee neighbors. The results of the assessment are based on information provided by trainees and by non-trainees living in trainee villages. Examination of the diffusion effect proceeds in three stages. First, the socio-economic differences between trainees and their neighbors are analyzed. Second, the contacts between trainees and non-trainees are examined; these include both personal contacts and "professional" contacts, where non-trainees showed interest in a trainees' example in health, farming, or home economics. Third is a review of the techniques which trainees diffused to non-trainees.

Socio-economic Differences Between Trainees and Their Neighbors

There may be some differences between trainees and their neighbors which preceded the training program. An understanding of such differences provides insight into what sort of people are recruited for training, specifically into whether or not people in higher socio-economic positions are recruited.

Agbor-Tabi (1981) concluded that trainees come from lower economic groups. His conclusion is based on a simple comparison of average landholdings and agricultural income of trainees and non-trainees. However, if non-trainee neighbors are older than trainees and have larger families (as is the case for respondents in the present study), the larger family work force available to them will both require and produce higher income based on increased agricultural production. It might also increase landholdings. Without isolating the effects of family size on income and landholdings, Agbor-Tabi's results cannot provide an accurate idea of the economic differences between trainees and their neighbors.

In the present study, three different indicators of socio-economic position are looked at, all pertaining to the head of household. These are his relationship with the village chief, the highest class he attended at school, and the number of brothers and sisters he has. The last indicator is important because the parents of a man with many brothers will lose much of their wealth in bride-price payments, while the parents of a man with many sisters will increase their wealth as they receive bride-price payments.

Fifty-four percent of non-trainees and sixty percent of trainees were closely related to the village chief. This small difference is not statistically significant. It therefore appears unlikely that being related to the village

chief enhances the chances of a farmer becoming a trainee.

Differences in schooling between trainees and non-trainees are analyzed in Regression 5. The effect of the household head's age is included in the regression because it is likely that for adults the highest class attained in school is negatively correlated with age, due to the increase over time of educational opportunities for rural people. Including a variable for the household head's age allowed the analysis to isolate the relationship between YFTC training and education from the influence of age.

(5) HEAD SCHOOL = 5.07 - .11 HEAD AGE + 8.05 TRAINEE

(significance) (.000) (.000) (.05)

-.23 TRAINEE (HEAD)

(.05)

$\bar{R}^2$ = .28 Regression significance = .000

HEAD SCHOOL = Highest class attained in school by household head

HEAD AGE = Age of household head

TRAINEE = Dichotomous variable for trainee

TRAINEE (HEAD) = Differential slope coefficient: TRAINEE* HEAD AGE

The coefficients in this regression permit us to calculate the differences in schooling for trainees and non-trainees of various ages. At 35 years old, trainees and non-trainees have the same educational level. Above 35, non-trainees have more education than trainees, while below 35 the opposite is the case. Since most trainees are less than 35 years old when they are recruited, it is likely that in general trainees are better educated than their neighbors.

A dichotomous dependent variable, TRAINEE, was regressed on variables for number of brothers and for number of sisters. Results are shown in Regression 6.

(6) TRAINEE = .48 - .08 BROTHERS + .04 SISTERS

(significance) (.000) (.015) (.096)

$\bar{R}^2 = .08$

Regression Significance = .046

These results indicate that each brother a man has may reduce his chances of becoming a trainee by 8 percent, whereas each sister may increase his chances by 4 percent. Both the regression and the $\bar{R}^2$ are significant at the .05 level. It may be that because trainees need the material support of their families while they forego one year's income during the training program, trainees are more likely to come from families whose resources are increasing, families with few sons and many daughters.

Social position, as measured by a person's relationship to the village chief, does not seem to affect the likelihood of becoming a trainee. However, it appears that people in advantageous economic situations, as measured by educational attainment and by numbers of brothers and sisters, are more likely to become trainees than their neighbors.

Contacts Between Trainees and Their Non-Trainee Neighbors

There are widespread "professional" contacts between trainees and non-trainees in the Dadjamka area. Table 6.1 shows the extent of these contacts. It appears that trainees and their farms are quite visible, and that many of their neighbors have at least a partial understanding of the techniques that the trainees learned at the YFTC.

Aghor-Tabi (1981) found much more limited contacts between trainees and non-trainees. Results of his study indicate that each trainee contacted 1.76 non-trainees, of whom 1.3 adopted a new technique taught by the trainee. The results of the present study indicate that each trainee in Dadjamka discussed new farming practices with twenty non-trainees. Even at the lowest bound of the 95% confidence interval, each trainee would have had contact with eight non-trainees. There are three possible reasons for the discrepency between these results and Agbor-Tabi's. First, Agbor-Tabi's data comes from respondents in the areas surrounding four YFTCs. For the present study, information on

TABLE 6.1: CONTACTS BETWEEN NON-TRAINEES AND TRAINEES

Non-Trainees who...	%	Estimate of number of households affected in the Dadjamka area
Believe that former trainees help their non-trainee neighbors (Dadjamka)	73	3,141[a]
Have listened to a former trainee talk about farming or about his training program (Dadjamka)	50	2,151
Have seen the field of a former trainee (Dadjamka)	100	4,302
Know the former trainee women in their village (Dadjamka)	83	3,570
(Goyang)	100	----
Are familiar with some of the YFTC course content (Dadjamka)	33	1,420
(Goyang)	12	----
Can describe some new techniques former trainees use (Dadjamka)	60	2,581
Have borrowed oxen and traction equipment from trainees (Goyang)	26	----

[a]There are 4,302 households in the villages inhabited by former trainees from the Dadjamka YFTC. 73% of 4,302 = 3,141.

Comparable census data could not be obtained for the Goyang area.

discussion between trainees and non-trainees was gathered only in the Dadjamka area. It may well be that there is a greater diffusion effect for the Dadjamka YFTC than for other YFTCs. Second, Agbor-Tabi's data concern only demonstrations. While trainees undertake very few demonstrations, they may have informal discussion with many of their neighbors. That is, only an average of 1.76 neighbors may attend a demonstration of a new technique by a trainee, whereas 20 neighbors may hear him mention the technique conversationally. Third, Agbor-Tabi appears to have based his results on trainees' own assessment of how many neighbors attended the demonstration of a new technique. But trainees themselves may not be aware of all the people who have heard them mention a new technique in passing. Results of the present study may indicate wider ranging contact between trainees and non-trainees than Agbor-Tabi's study because the present study is based on information from non-trainees, who may remember more of their contacts with trainees than trainees themselves would remember.

Despite the wide ranging contacts between trainees and non-trainees which are described in Table 6.1, there appear to be personal problems between some trainees and non-trainees that prevent even broader professional contacts. Consider for example the fifty percent of non-trainees who had <u>not</u> listened to a trainee talk about farming or about his training program. During informal discussions, many of these people expressed interest in learning more of

what trainees had learned at the YFTC. At the same time, they claimed to be reluctant to mention their interest to any trainee, saying that whatever the trainee had learned belonged to him and was none of their own business; they would be happy for the trainee on his own volition to discuss what he learned at the YFTC, but they felt unable to approach him about it. Similarly, some of the respondents who were unable to describe any of the practices learned by trainees at the YFTC claimed that the trainees had not demonstrated what they had learned because they wanted to prevent their neighbors from learning the same things.

Informal discussions with trainees themselves indicated that in fact they often were reluctant to give unsolicited advice or demonstrations to their neighbors. But their reluctance was not borne of any wish to prevent their neighbors from increasing their productivity; rather it was out of fear of being made fun of, which had frequently happened when they first returned to their village following training.

Discussions with trainees elucidated other problems in their contacts with non-trainees. Thirty-nine percent of trainees claimed that following their return from YFTC training they had had problems getting along with neighbors who were jealous of them for having received oxen and equipment following training. One trainee claimed that such jealously had led a neighbor to kill the trainees' two oxen

received at the YFTC. Other trainees mentioned land tenure disputes with non-trainees as being serious problems.

Such problems of village jealousies and misunderstanding are not unfamiliar to observers of rural life in many parts of Africa. In the case of trainees and non-trainees not all of these problems can be attributed to the YFTC training program. However, two aspects of the program, recruitment and trainee reintegration, may play a role in creating such problems.

Recruitment is done by the YFTC staff in a series of ten meetings in each of several villages over a period of four months. This process allows the staff to see which candidates are the most serious (as measured by attendance at the ten meetings) and the most likely to quickly grasp the new ideas and practices taught at the YFTC. Following these meetings, YFTC staff choose the trainees for the following year. The staff's choice is subject to veto by the village chief and elders.

The staff stress the responsibility of trainees to be village leaders and to demonstrate what they have learned to their neighbors at the end of YFTC training. Following the training, however, the YFTC staff does not help trainees organize meetings or demonstrations which interested non-trainees could attend. No structure is set up in the village to encourage the diffusion process and to overcome some of the misunderstanding between trainees and non-trainees.

Comments by both trainees and non-trainees mentioned earlier indicate that, despite staff exhortations about the trainees' responsibilities, neither group believes that trainees are responsible to actively disseminate what they learn during the YFTC training.

Generally, two to four trainees are chosen from each village. Following training they are encouraged to use part of their reinstallation subsidy to build a modern house in their village, and they are encouraged to relocate in the same place within the village. Sometimes a modern well is even dug by the government in the place where they relocate. Sodecoton also tries to obtain access to one full hectare of cotton-land for each trainee. Some land tenure disputes result from Sodecoton attempting to take land belonging to another farmer and bestow it upon a trainee (Sodecoton, 1980, ch. 5.1).

The reintegration of the trainees in their villages thus immediately sets them off physically from their neighbors, and may involve them in land tenure disputes where they have little village support. While the YFTC staff participates in this reintegration process, it is beyond YFTC control. The relocation, regrouping, and land policies are those of Sodecoton's Young Farmer Service. An understanding of the effects of such policies on intravillage communication and diffusion could have been obtained in this study only by concentrating most of the survey resources in

a single village. This was not done for reasons explained in Chapter 4. The most that can be said is that Sodecoton's policies of setting trainees off from their neighbors may exacerbate some of the problems of misunderstanding and jealousy mentioned earlier, and may thereby hinder the diffusion process.

One contention made by observers of the YFTC program is that is creates a village entrepreneural elite who will set themselves apart from their village by exploiting their neighbors for their own gain. The basis of this contention is that provision of trainees with oxen and equipment permits them to rent out their equipment to other farmers at very high fees (Meka-Engamba, 1978, p.5; Agbor-Tabi, 1981, pp.15,20; Kamajou and Gow, 1979, pp. 10, 13). This contention makes little sense in the Dadjamka area where large numbers of farmers have oxen and equipment, and where those who do not are able to rent them for half the fee mentioned by Agbor-Tabi (p.15).[1] Also, of farmers who rent their equipment and oxen to their neighbors, the survey showed that 31 percent of trainees did so for no payment, whereas only 15 percent of the sample of non-trainees in non-trainee villages required no payment."[2]

Diffusion of New Techniques From Trainnes to Non-Trainees

Survey results, as shown in Table 6.2, indicate the diffusion of some health and home economics practices in

TABLE 6.2: NEW TECHNIQUES DIFFUSED FROM TRAINEES TO THEIR NON-TRAINEE NEIGHBORS

Technique	% Non-Trainees
Row-seed red sorghum for the first time following the examples or advice of a trainee[a]	
(Dadjamka)	11
(Goyang)	0
Use certified seed for the first time following the example or advice of a trainee[b]	
(Dadjamka)	0
(Goyang)	0
Good animal nutrition for the first time following the example or advice of a trainee[c]	
(Dadjamka)	0
Helped by a trainee to train oxen	
(Dadjamka)	0
(Goyang)	0
New health and home economics practices learned from trainee women	
(Dadjamka)	0
(Goyang)	11

[a]A total of 50% of non-trainee neighbors in the Dadjamka area and 82% in the Goyang area seeded their red sorghum in rows in 1980.

[b]A total of 33% of non-trainee neighbors in the Dadjamka area and none in the Goyang area used certified food crop seed in 1980.

[c]A total of 71% of non-trainee neighbors provided nutritious food to their oxen in 1980.

Goyang, and lack of it in Dadjamka. This may in part be a reflectionof the dynamism and competence of the women's trainer in Goyang, who may encourage trainee women to get involved in teaching their neighbors.

Table 6.2 shows that only one agricultural technique, row-seeding of sorghum, is diffused by trainees to non-trainees. This is not surprising since there are almost no other farming techniques taught at the YFTC which increase yield per hectare, are practicable under village conditions, and are not already widely used in the Dadjamka area. The lack of diffusion of row-seeding of sorghum in the Goyang area is likely explained by the overwhelming number of farmers who have for years been row-seeding their sorghum there.

These results indicate that the YFTCs and the farmers trained there have very limited useful information to diffuse. The lack of techniques taught by the YFTC which are adapted to village conditions is indicative of the current weak agricultural research base in the area. The most serious constraints of farmers in the Dadjamka area are not being addressed by the agricultural research network.

The lack of adapted, efficient agricultural techniques taught by the YFTC may explain some of the personal misunderstanding between trainees and their non-trainee neighbors previously mentioned. Trainees may fear ridicule for demonstrating "new YFTC techniques" to their neighbors, since most of their neighbors already know and use such techniques. Non-trainees may think that trainees are hiding

some of the things they learned during YFTC training because they cannot believe that the trainees learned so little.

The problems of personal misunderstanding between trainees and their neighbors are secondary to the problem of the inadequate technical package advocated by the YFTC. Even if such personal problems did not exist, it is likely that the percentages on Table 6.2 would be little changed, for the simple reason that the YFTC has little in its current technical package which is capable of being diffused.

Summary

Economic well-being appears to increase the likelihood of a farmer becoming a trainee. Social status, as measured by a person's relationship to his village chief, appears to have no such effect.

Analysis of the diffusion effect lends support to the results of Chapter 5 concerning the inadequacy of the YFTC's technical agricultural package. Only one agricultural practice is diffused by trainees in the Dadjamka area. Several health and home economics practices are diffused by women in the Goyang area.

Despite the very limited real diffusion effect, there appears to be great potential for diffusion, in that there is much "professional" interaction between trainees and their non-trainees neighbors. Such potential might be further enhanced if the YFTC's recruitment policy and Sodecoton's

trainee reintegration policies did not exacerbate existing problems of misunderstanding between trainees and their nieghbors.

ENDNOTES FOR CHAPTER SIX

[1]He mentions a fee of 10,000 CFA per hectare. Bingen in September 1979 found the fee in Tchatibali county to average 5000 CFA (personal communication). The same fee, 5000 CFA per hectare, was found by this writer's interpreter, who himself had had to rent oxen and equipment within the preceding few months in Doukoula county.

[2]This may be due to the fact that non-trainees' equipment loan liability is twice that of trainees; non-trainees are therefore under much more serious cash flow pressure than trainees in making their annual repayment.

CHAPTER SEVEN

ASSESSMENT OF THE YFTC'S ROLE AS A DEVELOPMENT CENTER

This chapter evaluates the role of a YFTC as a development center. In addition to its direct role in training young farm families, who themselves may diffuse what they have learned to their neighbors, a YFTC can serve as a resource center for both trainees and non-trainees and can collaborate with other agencies in local development activities. Assessment of the role of a YFTC as a local development and resource center is based on interviews with all three samples, comprising trainees and non-trainees, in the Dadjamka area as well as with non-trainees in the Goyang area. Information from informal interviews with representatives of local agencies is also used. This chapter looks at the nature of a YFTC's contacts with former trainees, at its contacts with non-trainees, and finally at the nature of its collaboration with other local development agencies.

YFTC Contact With Former Trainees

Staff of the Dadjamka YFTC have frequent contacts with former trainees. The staff know most former trainees

by name and see them often, both formally (in their villages or at meetings in Doukoula and at the YFTC) and informally at the Doukoula market. Staff contacts with former trainees were not studied during the survey, and it is therefore unclear what sort of technical advice, if any, staff give to former trainees.

All former trainees interviewed had visited the YFTC during the previous twelve months for professional reasons, either to attend a meeting, to ask for help in buying an ox to replace a diseased one, or to repair equipment. Seventy-seven percent of former trainees had visited the YFTC to get their animal traction equipment repaired in the workshop.

Former trainees are not exclusively dependent on the YFTC for such professional advice and help. The YFTC is only one, albeit the most important, of several "resource centers". Table 7.1 shows other important sources used by trainees for the purchase and repair of equipment. The YFTC thus serves a useful and important role for former trainees, without making them dependent on its services exclusively. The RCC director plans to expand this role by creating a Province-wide cooperative network which might serve all former trainees by marketing their food crops.

YFTC Contact With Non-Trainees

In the Dadjamka area, forty-seven percent of the non-trainee sample in the trainee villages had visited the YFTC;

TABLE 7.1: PLACES OF EQUIPMENT PURCHASE AND REPAIR (DADJAMKA)[a]

	Trainees	Non-Trainee Neighbors	Non-trainees with no trainee contact
YFTC	77%	33%	0%
Sodecoton	32%	56%	88%
Private blacksmith or parts retailer	18%	33%	94%
Agricultural post	14%	56%	13%

[a]Percentages out of total number of farmers in each sample who undertook equipment purchase or repair. Column sums are greater than 100% because many farmers rely on more than one source for equipment services.

sixteen percent of those in the Goyang area had visited the YFTC. Many of these visits were for social reasons; others were for official functions, such as the Dadjamka YFTC graduation ceremony. Also, each year the chief and elders of each village which has sent trainees to the YFTC are invited to the YFTC for a one-day visit some time before graduation. Many non-trainee women also come to the YFTC in order to use its millet mill.

In the Goyang area, six percent of the non-trainee sample had visited the YFTC in order to purchase or repair animal traction equipment. In the Dadjamka area, eight percent of trainees' neighbors had visited the YFTC for the same reason, but none of those non-trainees with non trainee contact had done so.

Since many respondents did not need to purchase or repair equipment, it is instructive to look only at those farmers who did repair or purchase equipment. Table 7.1 shows the percentage of non-trainees repairing or purchasing equipment who used the services of the YFTC. Non-trainees in trainee villages used the services of the YFTC, while those in other villages did not. This may be due in part to the YFTC's somewhat closer proximity to trainee villages. Non-trainees may also have been encouraged to use the services of the YFTC as a result of their contact with trainees. In fact, seventy percent of the trainees claimed to have brought non-trainee friends on a visit to the YFTC. Although none of these visits were specifically for equipment repair, such

visits could have encouraged the non-trainees to return on their own to use the services of the YFTC.

The Dadjamka YFTC staff did not claim to orient any follow-up activities towards non-trainees, despite a belief to the contrary on the part of the RCC training advisor. Only three percent of non-trainees in trainee villages had any contact with YFTC personnel in their villages.[1] YFTC outreach is geared towards former trainees and its direct contacts with trainees' fellow villagers are quite limited.

As a resource center for non-trainees, the YFTC thus appears to have an important but passive role. Some of the neighbors of trainees take advantage of the services offered by the YFTC. The YFTC itself, however, makes little effort in the villages to establish relations with farmers other than trainees or prospective trainees.

The YFTC should be seen as one part of a growing network of modern firms and service institutions. Its sorghum mill, one of several in the area, is used by many women who live close to the YFTC. Its welding equipment is sought after on days when welding equipment is not operating in Doukoula. Its mechanic works on the agricultural implements, bicycles, and other equipment of trainees and non-trainees. Sometimes the YFTC sells or rents equipment which is not available elsewhere. Despite its limited efforts, the Dadjamka YFTC is serving the needs of many people in its area.

YFTC Collaboration With Other Local Development Agencies

The Dadjamka YFTC is one of the most important agencies in the Doukoula arrondissement, in terms of physical plant, personnel, and other resources. Like other agencies (Sodecoton, the hospital, etc.), its staff actively participates in the administrative life of the arrondissement by working with the local arm of the national party, by membership in the local development committee, and by making some of its resources generally available to meet government needs in the arrondissement.

The YFTC collaborates closely with some technical agencies. It uses the services of the government veterinary post to maintain the health of its herd; it sells a large quantity of cotton to Sodecoton each year; it also provides Sodecoton's Young Farmer Service with information on trainees' equipment and oxen holdings; it uses the health service for any trainee illnesses.

In addition, the YFTC has in past years shared its farm with the government's seed multiplication project. The seed multiplication project grows certified improved seed. Recently, the project greatly reduced its activities in Dadjamka in order to concentrate most of its resources at a much larger seed multiplication farm elsewhere. Other YFTCs have carried out agronomic experiments under the supervision of the regional agricultural research institute (IRA). During

the past year, IRA realized that such experiments demanded too much time of the YFTC farm chiefs. Experimental plots of YFTCs will be replaced by demonstration plots, under the supervision of IRA. The Dadjamka YFTC is being asked for the first time to manage a plot for the research institute in 1981.

Despite diverse collaborative efforts between the YFTC and local development agencies, these agencies do not participate in the actual training program of the YFTC. None of the major local agencies had any formal contact with trainees at the YFTC during the 1980-81 year; the veterinary and community development service were eager for such contact, since their work in villages proceeds more smoothly when farmers understand their goals and methods of operating. Such lack of collaboration is a serious deficiency in YFTC training, since trainees would benefit from exposure to the technical expertise of representatives of various government services. Such contacts could help the development agencies as well, since contacts made with trainees at the YFTCs could foster village cooperation with the agencies in the future.

Important opportunities for staff development are lost because the YFTC does not collaborate with other agencies in training farmers. Two examples of such lost opportunities come from the Dadjamka YFTC. Despite repeated encouragement by the RCC women's coordinator, the YFTC

director missed several meetings with the women's trainer of the local community development service to discuss ways that she could help his own women's trainer, who was in need of guidance. Also, the YFTC farm chief has so little contact with IRA that he did not know that the sorghum variety used on the YFTC farm was a composite rather than a hybrid, and that it could therefore be given to former trainees to plant year after year in their villages.

At the village level, the same lack of collaboration exists. The deficiency is most serious as regards Sodecoton's Young Farmer Service, since this service and the YFTC follow-up chief work with exactly the same people. There has as yet been no well-defined work program for the Dadjamka area detailing the mutual and respective responsibilities of the two agencies.

There may be much better collaboration between other YFTCs and the government agencies in their localities. The poor performance of the Dadjamka YFTC in this matter is ultimately the responsibility of the RCC, one of whose major tasks is supervision of the YFTCs and technical assistance to them. While the women's coordinator at the RCC was well aware of the problem, other RCC staff were not and had therefore done nothing to help the Dadjamka YFTC staff better collaborate with other government agencies.

Summary

The YFTC is a resource center for both trainees and their non-trainee neighbors, although not for non-trainees from other villages. Trainees and their non-trainees neighbors visit the YFTC for social reasons, for official functions, and to use its services (mainly sorghum milling and equipment sales and repair). The YFTC is not the exclusive provider of these services, but rather is one of several service firms and agencies in the area. Few non-trainees have contact with YFTC staff in their villages.

The Dadjamka YFTC is failing to collaborate with other local agencies in the training of farmers and is thereby missing important opportunities for trainee-development and staff-development. While such poor collaborative effort may not be typical of other YFTCs, it is ultimately due to inadequate supervision and technical assistance by the RCC.

ENDNOTES FOR CHAPTER SEVEN

[1]Not including contact during the recruitment process.

CHAPTER EIGHT

SUMMARY AND RECOMMENDATIONS

This chapter reviews the findings of the study and then makes recommendations to the Cameroonian government and to donors concerning future activities of the Young Farmer Training Center (YFTC) program. Recommendations arise from the assessment of the YFTC program presented in the preceding chapters, from a review of agricultural training and extension in other parts of Africa, and from discussions with personnel of the YFTC, the Regional Co-ordinating Center (RCC), and the Department of Agricultural Education (DEA). Some of the recommendations aim to strengthen the impact of the program on trainees, their neighbors, and their localities in general, while others are intended to help the program reorient some of its activities to increase their effectiveness.

Summary of Findings

Developing countries and the donor community are committing substantial resources to education in general and to agricultural training and extension in particular. Some past efforts at agricultural training and extension in

Africa have increased production, while others have had limited effects on production and have offered little help to farmers in solving their problems. Such failings are often due to inadequate technical recommendations or to very limited contacts between farmers and the training program.

The government of Cameroon has in recent years made substantial commitments to the training of rural youth, who are seen as the foundation for the country's agricultural development. The YFTC program is one of a number of agricultural development programs located in Cameroon's Northern Province, a cotton and sorghum zone. Its purpose is to train young farmers in modern agricultural technologies. The YFTC program began in 1969 with funding from private Swiss sources which served to build and staff one training center in Goyang. In 1974, a second center was built and staffed in Dadjamka, again with private Swiss funding. Shortly thereafter, the two centers became part of the Ministry of Agriculture, staffed and financed by the Government of Cameroon. An operational program grant from USAID to the IUCW in 1977 was used to build three more YFTCs and to build and staff the RCC.

Currently, there are five YFTCs, supervised by the RCC, which continues to receive staff and material support from the IUCW and USAID. Each YFTC trains young farm families for a year in agriculture, health and home economics. Its agricultural training is focused on animal traction technology. At the end of the training, participants receive two oxen and plowing equipment. In addition, a separate

government program provides returned trainees with a substantial grant to build a house and buy family necessities and with a loan to purchase other agricultural equipment.

This thesis presents results of an evaluation of the YFTC program. The evaluation is based on fieldwork carried out in 1980 and 1981 by an MSU team in Cameroon, and funded by the USAID operational program grant to the International Union for Child Welfare (IUCW) for the support of the YFTC program. The evaluation benefitted from the collaboration and active participation of YFTC and RCC staff. Research was conducted primarily in the area surrounding the Dadjamka YFTC. Some additional research was conducted near the Goyang YFTC.

Three different aspects of the YFTC program were evaluated: the training effect, the diffusion effect, and the role of the YFTC as a development center. In the absence of baseline data the training effect was assessed by comparing the current behavior of 27 former trainees with that of 18 similar non-trainees who had had no contact with them. The diffusion effect was assessed by examining the contacts that 90 neighbors of trainees had with them. Information on the role of the YFTC as a development center came from respondents in all samples.

Of the eleven farming practices taught at one YFTC, six are more widely adopted by trainees than non-trainees. Four of these six, planting sorghum in rows, planting certified

seed for food crops, weeding with animal traction, and ridging, show substantial increases in adoption as a result of training. The other two practices--good animal nutrition and castration of work animals--show only marginal adoption rates.

Practices relating to animal care show only marginal adoption rates or none at all largely because of farmers' previous experience with cattle and with animal traction in the area surrounding the Dadjamka YFTC. Were the training effect examined for other YFTCs, where farmers do not have this experience, it is likely that greater adoption rates for animal care practices would be found to follow attendance at the YFTC.

The remaining practices which are not widely used by trainees are either costly or impossible for many trainees to adopt on their farms. These include sole-cropping, crop rotations, and use of chemicals for seed treatment and storage. Evidence from many parts of Africa indicates that sole-cropping by small farmers does not optimize returns to land or to labor, nor does it reduce risk (Gilbert, Norman, and Winch, 1980, p.15; Monyo, Ker and Campbell, 1976, p.5.). Findings from this study suggest that sole-cropping may reduce returns to land. YFTC recommendations to plant food crops in sole stands are followed by very few trainees, probably for these reasons. Crop rotation recommendations are not followed by many trainees due to a land constraint as well as to land use decisions by the parastatal agency,

Sodecoton. Chemicals are not available in the area and therefore cannot be used by trainees for seed treatment and storage.

The limited effect of training on farmers' adoption rates is in large part due to a technical package which is inappropriate to existing on-farm circumstances. Development of this technical package has been beyond the control of the YFTC, since it comes out of agronomic recommendations made by French technical assistance and by the Cameroonian research agency (IRA), neither of which are familiar with the constraints faced by farmers in the area surrouding the Dadjamka YFTC.

YFTC training of women concentrates on improving their abilities as housewives and pays only limited attention to their abilities as farmers. Training emphasizes eleven health and home economics practices, of which seven show substantial adoption rates by trainee households as a result of YFTC attendance. A few of the practices adopted may reflect increased family resources following receipt of the reinstallation subsidy, oxen, and equipment rather than increased knowledge following training.

Many non-trainees are familiar with and interested in what trainees learned at the YFTC; there already exists a good foundation for the diffusion of new techniques from trainees to their neighbors. Only one technique is currently being diffused, however; this is the planting of sorghum in

rows. Diffusion is constrained by two factors. First, the inappropriate technical package does not lend itself to diffusion, since many of its practices can be used by neither trainees nor non-trainees. Second, YFTC recruitment methods and the government reinstallation subsidy (which provides trainees with $1500 in equipment, housing, and cash) isolate many former trainees physically and socially from their village neighbors.

Assessment of the YFTC's role as a development center shows that it is used for professional reasons by all former trainees; many non-trainees also visit the YFTC and use its garage and milling facilities. The YFTC collaborates with other local development agencies on practical matters. But the agencies have no role in the training process itself. Such a role would benefit not only the trainees, but also the staffs of the YFTC and the other agencies.

Policy Recommendations

A major reorientation of YFTC activities is called for to increase the program's impact. YFTCs must begin to participate in adaptive research and must begin working with village agricultural groups represented by the trainees. Such a reorientation requires outside impetus and could come from donor agencies. No new buildings are required since the five YFTCs need not expand until the program's activities are reoriented. What is required is support for the RCC in its

tasks of supervision and technical assistance to the YFTCs. The program needs to be reoriented in the following areas: agreement on goals, farmer input in YFTC activities, relating the technical curriculum to on-farm conditions, increasing the diffusion effect, length of training, supervision and technical assistance to the YFTCs, monitoring and evaluation and economic analysis.

Agreement on Goals

Program goals should be clearly stated and explicitly agreed to by all parties involved, including YFTCs, the RCC, the DEA, and donor agencies. Agbor-Tabi (1981, pp. 18-20) points out that almost no one directly involved in the YFTC program considered diffusion of innovations to non-trainees to be a YFTC goal, although USAID saw this as a primary goal.

Farmer Input in YFTC Activities

Currently, there is no vehicle for farmers' ideas or agronomic knowledge to be drawn on in the development of new technologies or in planning YFTC activities. Farmers' knowledge needs to be used in performing adaptive trials at the YFTCs and in villages (see following section). In addition, farmers must be brought into the planning of YFTC research and training. A YFTC farmer advisory committee needs to be formed to counsel the YFTC in its program design each year. One task of RCC supervisors must to be insure that the advisory committee is listened to and that YFTC personnel are

sensitive to the ideas and problems of local farmers. Involving farmers in the design of programs such as the YFTC program is an integral part of Cameroon's national policy, set out by President Ahidjo at the National Agricultural Fair in February 1981, of "making rural communities more dynamic" and of encouraging "participation of the rural world in the achievement of its objectives".

Relating the Technical Curriculum to On-Farm Conditions

Each YFTC needs to diffuse a technical package useable under the conditions faced by the farmers it trains. Because YFTC staff are in direct daily contact with farmers in their villages and at the training center, they are well situated to understand specific local conditions faced by farmers. Existing collaborative efforts with the research agency (IRA), where YFTCs perform experiments and demonstrations under IRA's supervision, must be redirected towards a program of farming systems research. Improving YFTC knowledge of local on-farm constraints would be the foundation for such research, organized together by IRA and the RCC training advisor and agronomist. With YFTC diagnosis of the most serious constraints faced by local farmers, IRA could design new technologies to break those constraints. These technologies could be tested and adapted by YFTC staff, under RCC supervision, with current trainees on the YFTC farm, and subsequently on the farms of former trainees and their neighbors.[1]

Some RCC personnel have expressed the sentiment that the YFTCs "should not do the work of IRA". What is suggested here is that IRA's technical research can best be used and diffused when it is adapted to local conditions. The program of farming systems research outlined here would allow IRA to optimize the use of its strengths in agronomic research to design new technologies; at the same time, IRA's strengths would be complemented by those of the YFTCs. The YFTCs' understanding of local on-farm conditions and their access to a broad network, among the trainees, of willing volunteers for on-farm testing and adaptation would contribute to a productive collaboration between IRA and the YFTC program. Results of the current study indicate that in the Dadjamka area this program of collaboration adoptive research needs to address first the problems of soil fertility, striga, and intercropping.

Soil fertility and striga. Declining soil fertility was mentioned as a problem by 60 percent of all farmers surveyed in the area. Crop infestation by striga, which is closely related to low soil fertility (Parker, Hitchcock, and Ramaiah, 1977),is a problem for 66 percent of the farmers surveyed. Many farmers are unable to combat these problems by practicing the crop rotation taught at the YFTC and used successfully on its own farm. In many villages, high and growing population density[2] results in land resources which are not adequate to allow fallowing for the recommended period of time. Also, Sodecoton's land use decisions may

preempt individual farmers' crop rotation decisions. Recommended crop rotations have therefore often not replaced traditional methods of composting and of manuring fields to maintain fertility and to reduce striga infestation. Farmers, extension agents, and the YFTC staff believe that manuring fields reduces striga infestation, and this is borne out by the survey results, which show a high negative correlation (-.43) between manuring and striga infestation. The large cattle herd in the area produces manure in quantity, but because the manure is often exposed to air for long periods of time, much of its nitrogen is volatilized before the soil can profit from it. Adaptive research needs to improve on traditional methods of composting[3] and manuring so that existing manure supplies are more efficiently used to maintain soil fertility and minimize striga infestation.

Intercropping and row-seeding. The YFTCs recommend seeding of food crops in rows and in sole stands. The majority of trainees seed sorghum in rows following YFTC attendance, and evidence from this study suggests that this practice may increase returns to land. However, very few trainees plant sorghum in sole stands as recommended. Evidence from many parts of Africa (see preceding section, as well as Chapter 2) suggests that it is to the advantage of small farmers to plant crops in mixtures rather than in sole stands. Evidence of this study tends to confirm these earlier results, although not at any acceptable level of statistical

significance. The YFTC program needs to reconsider its sole-cropping recommendation and to discover and test crop mixtures which may be more productive than the crop mixtures traditionally used by farmers. One avenue of exploration,given this study's analysis of row-seeding, may be to design and test patterns of alternate row intercropping which could increase returns to land or labor.[4]

Increasing the Diffusion Effect

In villages. Trainees' social isolation from their fellow villagers needs to be reduced in three ways. First, the policy and the method of providing trainees with the $1500 reinstallation subsidy needs to be reconsidered on the national level. Those aspects of the subsidy which tend to most isolate trainees, such as the construction of modern houses all together, and apart from non-trainees, must be reassessed and modified. Second, the problem of jealousy needs to be explicitly dealt with by insuring that everyone in a trainee village understands that trainees do not receive free equipment and oxen, but that they must pay for them by their labor on the YFTC farm and by repayment in subsequent years. Third, the YFTC must begin to recruit farmers as village representatives rather than as individuals. During recruitment, all villagers interested in becoming trainees or simply interested in learning more about YFTC agricultural techniques should form a village agricultural group. The

group itself, rather than the YFTC staff, will choose the trainees from among its members. During the recruitment process the specific responsibilities of trainees to the group and to the village must be understood and agreed to by all members of the group as well as by village authorities. After training, the YFTC follow-up staff will work with the village agricultural group rather than with individual trainees. YFTC staff need not work with the entire farming population of each trainee village; this is the job of the agricultural posts and of Sodecoton. Rather, the follow-up staff will work with the group of interested villagers that the trainee represents.

At the YFTC. The YFTC must actively draw farmers to it for reasons that go beyond equipment repair or official visits. Members of each village agricultural group should be invited to the YFTC on specific days during the training program to attend particular demonstrations or lectures. Current official visiting days for village leaders should be modified to include a training/demonstration component. (Most trainee villages are close enough so that people could arrive very early on foot or by bicycle and leave in the afternoon).

Length of Training

The optimal length of training will depend upon the nature of the technology and skills being taught. With a complex technology like animal traction, a fairly long training

program may be needed to insure that trainees have the minimal level of competence required to use the technology on their own farms. In Upper Volta, first-time animal traction users required three years to master the technology (Barrett, et al., 1981,pp. 126-127). Those YFTCs which train first-time animal traction users in the technology may be well-advised to maintain the existing one-year program.

In some YFTCs, animal traction technology will not be an important part of the training program, either because it is inappropriate to local conditions or because, as in the Dadjamka area, it is already skillfully used by most people. In these YFTCs, the legnth of training should be reassessed during the next few years. If the training package to be developed by the YFTC is capable of being taught in several days or several weeks, then the current year-long program should be greatly shortened.

For the immediate future, however, the length of training should remain one year, for two reasons. First, a primary motivation for farmers to attend the YFTC appears to be the receipt of oxen and equipment. The YFTC would be unable to provide these to trainees without the labor trainees perform on the YFTC farm during one entire year, since sale of the farm's harvest is used to purchase the oxen and equipment. Given the limited impact of current YFTC training in Dadjamka, it is unlikely that training alone, without the promise of oxen and equipment, would be an adequate incentive for many farmers to attend YFTC short courses. By immediately

shortening the legnth of training, the Dadjamka YFTC would thus lose local farmers' interest and goodwill, which are necessary for the successful implementation of adaptive research by the YFTC.

Second, shifting to shorter training programs would require increased commitments of YFTC staff time to recruitment and administration. There would be competition for staff time between these functions and the new adaptive research and group follow-up programs, especially in the beginning, when much staff time needs to be spent in initiating adaptive research and in better understanding farmers' constraints. The optimal allocation of YFTC staff resources is to use them initially to develop an adaptive research program and to expand farmer interest in YFTC training and adaptive research, and only afterwards to reorganize the training program itself so that adaptive research results will be available, through shorter training programs, to as many farmers as possible.

RCC Support and Technical Assistance to the YFTCs

None of the recommendations made would require an increase in the staffs of YFTCs. What they would require is a major reorientation of YFTC activities. Less staff time would be spent in recruitment, since the village agricultural groups would themselves take over some recruitment functions; but more time would be spent following up activities of village groups and of trainees. Other YFTC staff would have to

take over some of the farm chief's farm management functions so that he could spend time identifying important farmer constraints and working on experimental plots and farmers' test plots to adapt IRA technical recommendations to local conditions.

The Dadjamka YFTC staff is competent and dedicated; they are quite capable of undertaking the activities recommended here. But they need RCC support for two reasons. First, they have been following the same program routine for five years. A change requires outside impetus. Second, the professional training received by YFTC staff was technically focused. Therefore, they need guidance in learning to identify and prioritize farmers' constraints and in learning to organize and work with groups of interested volunteers.

The RCC should provide much closer supervision to the YFTCs and should provide technical assistance for adapting current agronomic recommendations to local conditions and for reaching more farmers through a reorganization of recruitment and follow-up activities. Currently half of the RCC program staff are saddled with responsibilities unrelated to the YFTC program. All RCC staff need to work full time on RCC/YFTC undertakings and need transportation to get to the YFTCs. At the same time, the RCC needs an applied agronomist with experience in farming systems research and possibly a social scientist. These two staff members, with the training advisor, will be able to help the farm chiefs reorient their activities and will coordinate YFTC efforts with those of IRA.

Improved Monitoring and Evaluation

The methodology for monitoring and evaluation, and the responsibilities for all data collection and analysis tasks, should be decided at the outset of any new donor-funded phase of the YFTC program. This would provide an incentive to program participants, both the national personnel and representatives of donor agencies, to implement mutually agreed-on goals. (Such clarification of monitoring tasks would have probably encouraged YFTC staff to promote the diffusion effect and the IUCW to provide the agronomist it never hired).

If program resources permit it, the methodology used in this study could be expaned towards a farming systems approach which would analyze changes throughout the farm due to training. Such an evaluation would require labor input data, as well as whole-farm data (instead of the data gathered on a single cropping enterprise in this study). If evaluation resources are less than those available for the present study, sample sizes could be reduced, especially for the sample of non-trainee neighbors. Assessment of the training effect must remain a priority. The diffusion effect could still be assessed by careful informal interviewing of some trainee neighbors. Evaluations with no access to computer facilities could hand -tabulate adoption rates for various practices among trainees and non-trainees.

Data-collection by YFTC staff needs to be improved in the immediate future in three ways. These improvements would

initially require increased RCC supervision of YFTC staff. First,monitoring the production of a without-training sample would permit continued assessment of the training effect. For the immediate future, this would require little extra YFTC effort, since a without-training sample already exists among those candidates for training who are not chosen. YFTC staff already collect production and household data on all prospective trainees, but then discard data from those who are not chosen. Such data should be kept and then updated when data on former trainees is updated. In the long run, with the establishment of a group recruitment method, many of these monitoring functions could be facilitated by the village agricultural group. Second, disaggregating household production data for husband and wife would permit separate assessment of the training effect on production for men and for women. Third, improving yield data so that it accounts for the presence of intercropping would greatly increaes its accuracy and utility.

Economic Analysis

A donor decision to renew support for the YFTC program requires more careful economic analysis than has been done in the past. Past support for the program has been justified by economic analysis which quantified benefits as the difference in trainees' income before and after the program. However, real economic analysis must be based on comparing benefits with and without the program (Gittinger,

1972, p.15). There is no reason to expect "with/without" benefits to match "before/after" benefits. Chapter Four discusses the reasons that "before/after" information is particularly misleading in the case of the YFTC program.

Appropriate donor support could provide the impetus to reorient the YFTC program as recommended in this chapter. Support is needed to increase RCC capacity to supervise and train YFTC staff in their responsibilities of adaptive research and group recruitment. The RCC needs an applied agronomist, possible an additional social scientist, and the means to get them out to the YFTCs at frequent intervals. Economic analysis of the YFTC program was not in the terms of reference of this evaluation. But it is likely that the limited donor investment needed to reorient YFTC activities towards adaptive research and widespread diffusion of its results would yield a high rate of return.

ENDNOTES FOR CHAPTER EIGHT

[1]These recommendations follow the sequence of diagnosis, design, and testing suggested by Gilbert, Norman, and Winch, 1980, p.11.

[2]68 persons per square kilometer, growing at an annual rate of 1.7 percent (de Garine, 1978, p.43)

[3]The local Doukoula section of Semnord designed an improved method of composting which some farmers claim to still use and which could be the starting point for such research (Guillard, 1965, p.213ff).

[4]Alternate row intercropping has been shown under experiment station conditions to increase yields in many parts of Africa. See Andrews, 1972, 1974; Grimes, 1963; and Keswani, 1977.

APPENDICES

ANNEX A

DATA ANALYSIS

ANNEX A

DATA ANALYSIS

Preliminary analysis of data from the agricultural interview and the women's interview was done in the field. The Michigan State University computer was later used to do significance tests on some of the preliminary data comparisons, as well as to analyze in depth the demographic and educational characteristics of trainees and to examine the effects of various cultural practices on the production of the red sorghum field. The computer was not used to analyze data from the agricultural interview in Goyang or from the women's interview in either area.

Training Effect

Analysis of variance permitted calculation of significance levels for trainee/non-trainee differences. Statistically significant differences are noted in the text. Most differences are not very statistically significant; in many cases this may be a function of sample size. Although 27 trainees were compared to 18 non-trainees, not all respondents were used in each comparison. For example, in comparisons of cultural practices used on the red sorghum field, only those respondents who themselves grew red sorghum were

included in the analysis; in this case only 24 trainees were compared to 16 non-trainees. This is not a large enough data base to permit the measurement of statistically significant differences except in special cases where the effects are very large.

Demographic and Educational Characteristics of Trainees.

Because training itself is not the only variable which may influence some of these characteristics, multiple regression analysis was used to isolate the influence of training from the influence of other variables. Again, not all the differences are statistically significant, due to a data base which is smaller than the number of respondents on whom data was gathered. For example, of the 18 trainees and 40 non-trainee neighbors on whom educational information was gathered, only 7 and 5, respectively, were household heads with any schooling.

Analysis of the Productive Effects of Cultural Practices

Because several different cultural practices affect production, multiple regression analysis was again used to isolate the effects of individual practices on production.

ANNEX B

PRODUCTION COEFFICIENTS UNDER DIFFERENT PRICE/QUANTITY ASSUMPTIONS

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PRODUCTION COEFFICIENTS UNDER DIFFERENT PRICE/QUANTITY ASSUMPTIONS

The wholesale prices and volume measurements obtained for red sorghum, millet, and unshelled cowpeas are believed to be accurate, as are the retail prices gathered for all food crops except sorghum. Volumetric measurements obtained for sesame, shelled cowpeas, and "nyesine" are of questionable accuracy. Therefore alternative production analyses were run to address two problems: the lack of standard prices, since some foods were priced at wholesale, others at retail; and volumetric measurement error.

Rows 1 and 2 of Table A.1 (corresponding with Regressions 1 and 2 in the text) assume that volume measures are accurate. Retail prices for sesame, shelled cowpeas, and nyesine are deflated by the ratio of wholesale to retail millet price.

Results in rows 3 and 4 are based on deflated retail prices as in (1) and (2), and, in addition, the possibility of volumetric measurement error is compensated for. Volumetric measurement error had been perceived and accurately determined for unshelled cowpeas. Since sesame and nyesine used the same kind of local measuring unit as unshelled

Table A.1 PRODUCTION COEFFICIENTS UNDER DIFFERENT PRICE/QUANTITY ASSUMPTIONS

	Constant	Plow	Row Seed	Manure	Intercrop 1	Intercrop 2	Minor Flood	Much Flood	$\bar{R}^2$	Regression Significance
1.	29416	-23797	15975	24157	13530		-12925	-22617	40	.005
	(.007)	(.01)	(.06)	(.01)	(.16)		(.16)	(.07)		
2.	35243	-20608	13016	20398		262	- 9817	-18638	40	.006
	(.000)	(.04)	(.10)	(.06)		(.18)	(.31)	(.11)		
3.	30982	-20299	12557	20941	11242		- 9529	-19617	37	.009
	(.002)	(.015)	(.09)	(.016)	(.19)		(.24)	(.07)		
4.	35962	-18375	10382	18561		211	- 7463	-16487	36	.010
	(.000)	(.04)	(.14)	(.05)		(.27)	(.37)	(.11)		
5.	30759	-20563	13163	21731	10752		-11298	-20180	37	.008
	(.002)	(.016)	(.08)	(.015)	(.215)		(.17)	(.07)		
6.	36181	-19292	10812	20025		174	- 9540	-16831	35	.011
	(.000)	(.037)	(.134)	(.045)		(.347)	(.28)	(.116)		
7.	31508	-18890	11527	20193	9658		- 9674	-18746	35	.012
	(.001)	(.019)	(.104)	(.017)	(.239)		(.217)	(.075)		
8.	36455	-18068	9529	18999		152	- 8327	-15805	33	.015
	(.000)	(.037)	(.163)	(.041)		(.384)	(.312)	(.119)		
9.	53240	-41206	30690	39732	19737		-23578	-41703	28	.032
	(.019)	(.036)	(.08)	(.051)	(.327)		(.222)	(.106)		
10.	61249	-34078	25285	31993		517	-17841	-35444	29	.029
	(.001)	(.11)	(.126)	(.154)		(.262)	(.373)	(.146)		

cowpeas, rows 3 and 4 deflated the value of sesame and nyesine harvested by a factor representing the measurement error assessed for unshelled cowpeas.

Millet and sorghum are partial substitutes, yet wholesale millet price was more than twice the wholesale price of sorghum, a price difference observed nowhere else in North Cameroon. It is possible therefore that wholesale millet prices were greatly overestimated. Rows 5 and 6 result from the same deflation of retail prices used in rows 1 and 2, plus an additiona deflation based on the possibility that wholesale millet prices had been seriously overestimated.

Rows 7 and 8 combine all the deflationary factors used in rows 1 through 6 for wholesale prices, volumetric measurement error, and overestimated millet prices.

Rows 9 and 10 are based on geometrical estimation of the volume in liters of all local measuring units. Volume was converted to weight, using volume-to-weight equivalences from northern Cameroon and northern Nigeria.[1] Then weight was valued at prices in the regional capital, Maroua, since prices per unit weight were not available for the Doukoula market.

The greatest explanatory power came from the first two sets of assumptions, based on deflated retail prices. However, whatever assumptions are chosen, signs and orders of magnitude do not change for any of the coefficients. The analysis presented in Chapter 5 would therefore be supported under any of these assumptions.

ENDNOTE FOR ANNEX B

[1]I am indebted to Tom Zalla, Larry Lev, and David Trechter for the North Cameroon data, and to Will Whelan for the northern Nigeria data.

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