

TCP/KEN/4551(T)
Field Document

TECHNICAL COOPERATION PROGRAMME

THE IMPACT OF THE FIELD DAY EXTENSION APPROACH
ON THE DEVELOPMENT OF FISH FARMING
IN SELECTED AREAS OF WESTERN KENYA



LAKE BASIN DEVELOPMENT AUTHORITY

FOOD AND AGRICULTURE ORGANIZATION
OF THE UNITED NATIONS

SUPPORT TO SMALL SCALE RURAL AQUACULTURE
IN WESTERN KENYA

KISUMU, KENYA
June 1995

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PREPARATION OF THIS DOCUMENT

This field document presents the results of an assessment of the introduction of the field day extension approach to fish farming development in Western Kenya. The work was carried out *in* 1995 in Western, Nyanza, and Rift Valley Provinces of Kenya under the auspices of the Lake Basin Development Authority in collaboration with the FAO Technical Cooperation Programme TCP/KEN/4551 (T) "Support to Small Scale Rural Aquaculture in Western Kenya". The paper is primarily addressed to the project staff, and other workers in the field who may encounter similar situations. The work was undertaken by the entire Fisheries Division of Lake Basin Development Authority.

This Field Document is one of a series of reports prepared during the course of the project identified on the title page. The conclusions and recommendations given in the report are those considered appropriate at the time of its preparation. They may be modified in the light of further knowledge gained at subsequent stages of the project.

The designations employed and the presentation of the material and maps in this document do not imply the expression of any opinion whatsoever on the part of the United Nations or the Food and Agriculture Organization of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

Abstract

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This paper presents the results of an impact survey undertaken in 1995 to assess the field day approach to fish farming extension in Western Kenya. Previous fish farming development projects had used the "training and visit" approach to fish farming for 8 years. The field day approach was introduced in 1994. In 1995, a series of 11 field days were held on specific topics in each of 13 selected areas of Western Kenya where there were a total 677 practicing fish farmers. The annual rate of recruitment for new fish farmers quadrupled in the sampled areas in 2 years. An average of 30% of the farmers attended each field day in each area. Following this series, a survey showed that between 70 % and 90 % of the farmers who had attended a particular field day had improved their management techniques and were able to answer detailed questions on the specific topic. For those farmers who had attended 3 or more field days but missed that particular topic, between 24 % and 84 % were able to correctly answer detailed questions on all field day topics, demonstrating inter-farmer exchange of information. Of those farmers who had attended 3 or more field days, 30% were expanding their fish ponds and 41 % were effecting repairs. The cost of training a farmer through a series of field days was half that of formal courses. The paper concludes that the field day approach of fish farming development is viable in Western Kenya and recommends that it be expanded.

LIST Of ABBREVIATIONS

are	100 m ²
BSF	Belgian Survival Fund
FAO	Food and Agriculture Organization of the UN
Ksh	Kenya Shilling (1 US \$ = 55 Ksh, Sept 1995)
LBDA	Lake Basin Development Authority
UNDP	United Nations Development Programme

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1 INTRODUCTION

The general objective of any extension service is to introduce better methods, new techniques, and different, more productive practices to a targeted population. Small scale fish farming is a relatively new activity in Africa. Development of fish farming in rural Africa is promoted as a supplementary protein source, income generation, and diversification of farm activities. The successful, widespread introduction of a new technology such as fish farming requires that a very large number of farmers learn the basic principles involved. In actual practice an extension officer can only train a relatively few number of farmers. This is due to limits of manpower, available time, distance, and the sheer numbers of farmers involved.

Much of the information and knowledge about fish farming passes throughout the rural population by inter-farmer exchange. Initially, a few farmers are trained and begin fish farming. Should the new technology proves beneficial to those farmers, neighbors well attempt to imitate this success. These "second generation" farmers will, more often than not, depend on the first group of farmers for their basic information, and not the extension agents. The initial group of farmers take pride in being able to teach others. The process can then continue to third and fourth "generation" farmers. It is then crucial that correct and appropriate information is given to the initial core of farmers

The development of rural fish farming in Africa has, for the past 20 to 30 years, been largely based on the "Training and Visit" extension approach. Initially a group training of potential fish farmers is done. Fish farming extension officers are then based in the field where they visit individual farmers and assist them with their specific problems. This approach has the following constraints; Fish farming is new to Africa and is relatively complex. It is difficult at best for rural farmers to master all the necessary techniques following a few days in a class room. Further individual assistance is needed. There is, however, a limit to how many individual farmers the extension officer can properly advise. Finally, there may be a creation of an inadvertent dependency of the farmer on the extension officer. The farmer may come to depend on the extension service to provide not only guidance and advice, but also to assist with procurement of fish fingerlings for stocking, feeds, help in sampling and harvesting, and even the sale of fish. The farmers may, in the end, learn enough about fish farming to continue on their own. There is usually no emphasis to help the farmers become self-sufficient. In fact the opposite can often occur. The extension officer may well believe that it is in his own best interests to keep the farmer dependant upon his continued assistance.

An alternative is termed the "Field Day" extension approach. This technique is becoming increasingly popular with rural agricultural extension. Interested farmers are invited to a particular farmers' field or plot and a short, specific topic is demonstrated and discussed. The session takes no more than 1 or 2 hours. The interaction between the farmers and the extension officer allows the latter to learn what areas need further support. The interaction between the farmers themselves allows an exchange of ideas, experiences, and further information. A system of mutual support can develop. The end result is an increased general level of knowledge on a specific subject. A single extension officer can conduct frequent field days throughout a region, allowing more contact with more farmers. The major constraint with the field day approach is that there is little time for the extension officer to assist an individual farmer with a specific problem.

The Lake Basin Development Authority (LBDA) has the mandate to coordinate development activities in the Kenyan *portion* of the watershed of Lake Victoria. The area has a population in excess of 10 000 000, but covers less than 10 % of the area of

Kenya. The Fisheries Division of LBDA has, with the assistance of the BSF, UNDP, and FAO, operated a series of projects over the last 10 years aimed at developing fish farming in the area. The general development goal is to create a self-sustaining fish farming industry that is increasingly less dependant on external support.

In 1995, there were about 6,000 practicing small-scale, rural fish farmers in the region. This is a very modest percentage of the population and there is considerable scope for expansion. The management techniques used at the majority of these existing fish farms are still at a very low level. Harvest yields are often below 10 kg/are/year and there is room for substantial improvement. This low level of production is probably the leading cause for the slow increase in the total numbers of fish farmers; the benefits derived from current fish farming management practices are too low to entice others to begin.

The training and visit approach to fish farming extension was used during the first 8 years of project assistance. The field day approach was introduced in 1994, the last year of the FAO/UNDP/BSF Project "Development of Small Scale Fish Farming in the Lake Basin Area, Phase II". There were 2 principle reasons for this shift in approach. In late 1992 a restructuring exercise at LBDA led to the layoff of nearly 2/3 of the extension staff. The remaining staff (40 persons) were not able to give individual assistance to the several thousand farmers. Secondly, the results obtained through the training and visit technique did not meet expectations, and a new approach was deemed necessary.

The project consolidated and reorganized the extension service during 1993. In 1994, a series of 269 field days were held with a total attendance of over 6 000 existing and 9 000 potential fish farmers as well as some 35 000 students. The general objective in the field days held in 1994 was to create a wide-spread awareness of fish farming, introduce practicing fish farmers to new techniques, introduce potential fish farmers to those who have already begun, to assist in the teaching of fish farming in schools, and to familiarize the extension staff with the concept and ways and means of conducting field days.

In 1995, LBDA and the FAO Technical Cooperation Programme executed a project entitled "Support to Rural Aquaculture in Western Kenya, TCP/KEN/5441 (T)". This project began in April of that year and lasted 7 months. A major component of the project was to continue to support the rural fish farmers in Western Kenya through the field day approach, but with more emphasis on specific, technical aspects of fish farming. The general objective was to increase the production level in existing ponds through better management.

This paper describes the impact of the field day approach on improving fish farming practices in selected areas of Western Kenya. The growing cycle for fish in Western Kenya is 6 to 8 months. The time limits of the TCP project were too short to determine if production levels increased or not, however the improved management practices should lead to higher yields.

2 MATERIALS AND METHODS

2.1 The Study Areas

The Lake Basin Region covers the watershed of Lake Victoria and extends from the Uganda border in the north to the Tanzania border to the south. The area extends to the Rift Valley in the east and the Lake shore forms the boundary in the west,

The TCP project concentrated the field days in 13 areas (see Figure 1). These areas are characterized by a relatively high concentration of existing fish farmers, good climatic conditions, and a high potential for expansion. Many other areas of Western Kenya are also highly suitable for fish farming development. Only these areas were chosen due to constraints of time, financial resources, and a lack of personnel.



In each area, a rough circle with a radius of 15 km was drawn on a map. The size of the territory was made with the consideration that this would be about the maximum distance that a farmer would travel to attend a field day. All fish farmers located within this circle were considered as a group.

2.2 Initial Assessment

In the 2 months before the field days began, a survey was made of the practising fish farmers in the targeted areas. Extension officers who had been working in the selected areas were asked to compile a list of all existing fish farmers within the 15 km radius. Information was gathered on the size and numbers of ponds, manuring and feeding practices, whether or not compost was used in the ponds, if records were kept, and the years of fish farming experience. The farmers were then asked what were their principle constraints or problems in fish farming. The guidelines for this exercise stated that the actual responses from the farmer should be used. This was done to judge the level of knowledge of the farmer on the subject of fish farming, and to find out what the farmer perceived as his own constraints. The information was then entered on a data base and analyzed.

The objective of this exercise were to find the specific problems common to many farmers. These could be addressed in the field days that followed. From discussions with the staff doing the survey, it was obvious that there were misconceptions held by many farmers about fish farming and the biology and physiology of fish In general. The most important aspects were also addressed in the following field days.

2.3 Field Day Organization

The first field day of the series was organized by inviting all the fish farmers in the targeted area to a particular farm. At that venue, the dates and location for the next field day were decided by consensus between the farmers and the extension officers. Only one specific topic was demonstrated and discussed in each field day. Initially, 2 field days per month were held in each area. Time was a limiting factor, and in the last 2 months the number of field days was increased to 3 a month. As far as possible, field days were held at a farm where the specific topic of the day was already being practiced or could easily be demonstrated. This is most important, *the* topic or principle being taught should be in actual practice at another farm in the region with similar conditions.

Extension officers used, as much as possible, equipment and materials borrowed from the farmer who hosted the field day. Officers intentionally avoided bringing in more elaborate project equipment and materials such as fish transport cans, dip nets or fancy seine nets, weighing scales, thermometers, and oxygen or pH meters. This can easily lead the farmers to believe that fish farming is more complicated than it actually is and that such equipment is necessary for success while it is not.

If necessary, posters were made in the local language and diagrams or drawings from books were copied on large sheets of paper. The emphasis was hands- on training and physical participation of the farmers. Dialogue between the farmers themselves and between the extension officers was encouraged; the officers were told to ask as many questions as they answered. During each session, the extension officers would ask the participants a few questions on topics of previous field days to help tie ail the information together. Field days were designed to last no more than 2 hours. Two or 3 extension officers were present at each field day, This allowed as much contact between farmers and qualified officers as possible during the short time. Most farmers arrived at the venue on foot or bicycle. A bottle of soda and a piece of bread were offered to the

participants as refreshment. A minimum of 5 and a maximum of 12 field days were held in each area.

2.4 Topics Chosen for Field Days

The subjects presented in the field days were based on the problems identified in the initial survey. Again the general objective was to improve production techniques in existing ponds. With each topic, an outline of the subject giving the essential elements was written by senior project staff and given to the extension officers several days before the field day for personal study. The extension officers were then free to expand and elaborate from this common base of information. The notes proved to be particularly helpful to the staff. The following gives a brief description of each field day topic and why each subject was chosen. Some of these topics are particular to the socio-economic situation in Western Kenya and may not necessarily form the priorities for other areas.

2.4.1 Manuring the Fish Pond

Responses from the initial survey and discussions with farmers and extension staff showed that many farmers do not understand the value of heavily manuring a fish pond in Western Kenya, the livestock industry is reasonably well developed and many farmers have dairy or beef cattle, chickens, sheep and goats. Actual manuring practices vary considerably, but very few farmers were adding enough manure to boost fish production beyond a minimum. There are also a few areas where there is a total misconception about adding manure to a pond; some farmers believe that manure is harmful to fish.

2.4.2 Compost in a Fish Pond

About half of the farms surveyed had a compost crib built in the pond. Many of these cribs were under-utilized. The course emphasized that this is a supplement, not a replacement, for heavy manuring.

2.4.3 Pond Repair and Maintenance

Water depth is a major problem, older ponds have not been maintained and many ponds are very shallow (less than 20 cm). This leads to excessive environmental stress on the fish and predation. Some farmers believe that an infestation of rooted water weeds in a pond is good as this supplies shelter and food for the fish. In fact the fish do not eat the weeds, it lowers primary production which means less algae which the fish do eat, and creates less than optimum environmental conditions for the fish.

2.4.4 What Species of Tilapia to Grow

Several farmers stock *Tilapia zilli*, *T. rendalli*, *O. variabilis*, and *Halpochrmine* sp. None do as well as *O. niloticus* (= *T. nilotica*) in ponds in Western Kenya. This field day explained the differences between the species and how to tell them apart. The term "Tilapia" is commonly used throughout Western Kenya to describe any cichlid fish. To avoid unnecessary confusion, the project used the term "Tilapia" instead of *Oreochromis*.

2.4.5 *Clarias gariepinus*

The artificial reproduction and culture of the African catfish, *C. gariepinus* was introduced into Western Kenya in 1994. In Funyula, many farmers had previously been capturing small *Clarias* sp from the wild and stocking them in ponds with mixed results. There are over 15 species of *Clariidae* in the Lake Victoria drainage. All are very similar in appearance to *C. gariepinus*, particularly in the juvenile stages. Most of these other

species do not grow beyond 30 cm, The course showed how to differentiate the species as well as culture practices.

2.4.6 Oxygen in a Fish Pond

This is considered basic information needed to understand the dynamics of fish production in ponds; the importance of primary production, fish physiology and health, transport of live fish, and the importance of pond maintenance and fertilization in the pond environment.

2.4.7 Record Keeping

Most farmers do not keep adequate records. The course emphasized that this is for the benefit of the farmer himself and how to use records for improving fish production.

2.4.8 Sampling Fish

Few if any farmers sample fish regularly through out the growing cycle, thus there is no way the farmer can tell how the fish are growing, what their condition is, if the ponds are over-population by fingerlings, etc, The course emphasized why sampling is advisable, and locally available materials for sampling.

2.4.9 All-Male Tilapia Culture

The course taught how to determine the sex of tilapia and the benefits of using more males or all males in the culture,

2.4.10 Feeding Fish

Several farmers consider fish to be a "wild animal", which can fend for itself. The course addressed this widespread misconception among farmers,. The price of agricultural by-products in Western Kenya has increased over 200% in the past few years while the price of fish has remained stable. This has led to a situation where feeding fish as the principle means of increasing production is becoming increasingly less economical. The course emphasized that feeding is a supplement to heavy manuring, and how to maximize the use of the feed.

2.4.11 Good Fish Farming Practices

This course was the final field day held in the series and summarized all the previous courses.

One major problem identified in the initial survey was the poor siting and construction of the existing fish ponds. The topics of site selection and pond construction were not addressed in this series of field days. Emphasis was made on improving existing ponds instead of constructing new ones; it was most unlikely that fish ponds would be entirely rebuilt by farmers.,

2.5 impact Assessment

An attendance record was kept for all field days. Many fish ponds in Western Kenya are owned or managed by Women or Youth groups. The group was considered a single entity and even if several members of the group attended a particular field day, the number of members was not counted and only the presence or absence of the group was indicated.

When the series of field days had been completed, a second survey was undertaken to assess the impact. There are two aspects; tangible improvements in

management practices, and the increase in the fish farming knowledge level of the rural farmers. A questionnaire/visit form was designed with these two aspects in mind, A standard data collection form was made (see appendix i) and recorded the attendance of each farmer at each specific field day. This portion of the form was filled out before visiting the farmer. A few questions were asked on each topic to see if the farmer had grasped the necessary principles.

A second aspect of the survey was to assess the physical improvements made since the initial survey, such as increasing the water depth by raising the dikes, repairing the dikes to stop leaking, adding a compost crib, and cleaning the water weeds. These could be visually verified and recorded on the form.

A farmer may often answer a question with a response tailored to please the interviewer, for example saying that he manures heavily when he actually does not. The questionnaire thus *had* entries for *the* opinion of the interviewer on the veracity of the responses, as well as physical signs of the activity taking place. This is admittedly subjective, but an experienced officer can see physical signs of feeding and manuring, if the fish are properly fed, there is a definite feeding response by the fish; they swim to the area of the pond where the visitor is standing. There may be feed residue *on* the dikes, wheelbarrow tracks, etc. Manuring can be verified by the presence (or absence) of bits of manure floating in the pond and the obvious fertility of the water,

A team of senior project officers who had not taken part in conducting the field days carried out the impact survey. They were assisted by senior extension officers who had organized field days in another area remote from where the impact survey was made. The composition the survey team for each area was made to avoid favoritism and biased answers, Due to the constraints of mobility and funds, only farmers who had attended at least 3 field days in the series were visited (in Lurambi, due to the very high attendance rate, *only* those who had been to 5 or more field days were interviewed). Time was also limited and the impact survey team could only spend 2 or 3 days in each area, visiting as many of the farmers as possible. In each area, at least 2 farmers who had attended less than 3 field days (mostly none at all) were visited and asked the same questions, as well as why they had not come to the field days.

3 RESULTS AND DISCUSSION

3.1 Initial Survey

A total number of 492 farmers were surveyed in the 13 areas. This survey proved to be less helpful than hoped. The extension officers who conducted the survey were well trained in the technical aspects of fish farming, but had not been trained *to conduct* surveys or *in* data collection. It is relatively easy to collect information on the sizes and numbers of fish ponds, but more difficult to collect information on the actual management practices. There is often a big difference between what the farmer says he does and what actually takes place, and it soon became clear that much of the data collected during the initial survey was misleading. For example, many farmers answered questions about feeding their fish by saying that they fed 2.4 kg per pond per day of maize bran. The same farmer later said that the major constraint to increased production was the lack of feed; many said it was unavailable. The two statements are contradictory. Many of the responses appeared to be influenced by the surveyor, The person doing the survey was also the person who had been previously responsible for the extension work in the area, and there was perhaps a tendency to make things appear in a more favorable light than was actually the case. It was also obvious that there was a considerable amount of technical embellishment during the survey. For

example, when asked about putting manure in the pond, a farmer would respond that yes, he adds manure. How much? The farmer shrugs his shoulders. The interviewer then writes down 30 kg per week.

The most obvious shortfall of the initial survey was the effort of determining the farmers' own conception of his constraints. It was immediately clear that the constraints and problems identified in the survey were almost entirely made by the interviewer. Furthermore each interviewer had his own personal subjective interpretation of what these major constraints might be. The reported problems varied considerably, anywhere from "lack of technological knowledge" 'poor site selection", to "no outlet for the pond". The information gathered on the farmers' perception of his own problems was of little value and this information is not included in this report.

The survey did give some background information on the general status of fish farming in each area, but it was not possible to identify highly specific topics for field days in each selected area. The general consensus among the persons doing the initial survey was that the knowledge base of the rural farmers was sporadic at best and much of the course material for the field days was then of a more general nature with the same basic topics given in all areas.

Finally when the series of field *days* began, there were significant!) more practicing fish farmers attending the field days than were initially surveyed, although this varied from area to area. Many of these farmers were located within the 15 km radius but were previously unknown by the extension officers. This is a demonstration of the multiplier effect with new farmers learning from old ones most of these new farmers had begun fish farming in only the past 1 year. This also shows the limits of the training and visit approach to extension. The results of the initial survey are summarized in Table 1 on the following page

3.2 Field Day Attendance

In almost all areas, there were more practicing fish farmers attending the field days than had been included in the initial survey. In the course of the field days, other farmers began constructing fish ponds for the first time. Table II gives the attendance records for each survey area and the number of unknown or new farmers in those areas.

There were a total of 140 field days held in all the 13 areas. Attendance varied considerably from area to area. The total number of possible field days that could be attended in each area was 10 or 11 (with the exception of Kipkelion where only 5 were held).

For the purposes of the survey, it was considered that an attendance of 3 field days would be necessary to judge if the field day approach had any impact or not. This gives a minimum attendance of 25% to 35%. Table III presents the attendance data in terms of the number of farmers attending 0, 1, 2, or 3 and more field days during the test period.

Table 1						
Summary of findings from the initial survey of practicing fish farmers in the targeted areas of Western Kenya.						
Survey area.	Number of Farmers	Average years of experience	Number of ponds	Total pond area m2	Avg pond size m2	Polyculture with Clarias number of ponds
Bongore	15	0.9	15	2 580	184	no data
Funyula	28	5.5	59	15 262	262	45 or 76%
Kimilili	26	5,1	64	15 087	235	10 or 16%
Kipkelion	15	4,2	20	6 019	300	4 or 27%
Suneka	52	7.5	78	13 455	172	no data
Koibarak	29	1.5	29	12 220	420	2 or 7%
Kuria	40	4,2	58	10 324	178	no data
Lurambi	26	3,9	40	11 256	281	24 or 92%
Migori	59	5,5	181	43 384	240	no data
Rangwe	63	4.5	87	29 758	342	no data
Rigoma	86	5,6	152	31 022	204	no data
Sondu	23	0.5	47	10 046	213	6 or 26%
Yala	30	11.7	61	12415	203	20 or 67%
Totals:	492		891	21,3 ha		

Table II						
Summary of Field Day attendance during the 4 month study period						
Survey area	Number of Farmers (initial survey)	Number of unknown/new farmers attending	Total farmers attend in area	Average attendance per day	percent (total farmers)	Total farmer days
Bongore	15	31	46	13	28%	134
Funyula	28	20	58	23	40%	275
Kimilili	26	26	52	24	46%	241
Kipkelion	15	0	15	7	46%	37*
Suneka	52	0	52	10	19%	88
Koibarak	29	35	64	11	17%	116
Kuria	40	11	51	11	21%	100
Lurambi	26	31	57	22	38%	242
Migori	59	9	68	10	15%	89
Rangwe	63	2	65	14	22%	136
Rigoma	86	2	89	14	16%	137
Sondu	23	0	23	15	65%	150
Yala	30	18	48	19	40%	231
Totals	492	185	677		1 976	

* only 5 field days held in the area, extension officer was ill.

Table III				
Frequency of Field Day attendance during the 4 month study period				
Survey area	Number of farmers with no attendance	Number of farmers 1 F.D. only	Number of farmers 2 F.D. only	Number of farmers attending 3 or more days
Bongore	1 (2%)	11 (24%)	14 (30%)	41 (89%)
Funyula	5 (10%)	6 (13%)	7 (15%)	31 (63%)
Kimilili	6 (11%)	4 (8%)	8 (11%)	37 (70%)
Kipkelion	1 (7%)	4 (27%)	3 (20%)	7 (46%)*
Suneka	23 (36%)	10 (19%)	6 (12%)	13 (25%)
Koibarak	34 (53%)	11 (17%)	3 (5%)	16 (25%)
Kuria	13 (25%)	14 (27%)	9 (18%)	15 (23%)
Lurambi	4 (7%)	9 (7%)	10 (18%)	34 (60%)
Migori	17 (25%)	25 (28%)	15 (22%)	11 (16%)
Rangwe	33 (15%)	11 (17%)	4 (6%)	17 (26%)
Rigoma	37 (42%)	29 (33%)	8 (9%)	15 (17%)
Sondu	2 (9%)	2 (9%)	1 (4%)	18 (78%)
Yala	11 (23%)	3 (6%)	6 (13%)	28 (58%)
Totals	187 (26%)	139 (20%)	92 (13%)	282 (40%)

* only 5 field days held in the area, extension officer was ill.

On a global basis 3 or more field days were attended by 40 % of the practicing or new farmers. Of these, over 80 % attended half or more. Again using data from all the combined areas, a significant number of farmers (26%) did not attend any field days whatsoever, 20 % only attended 1 field day, and 13 % only attended 2 field days, From Table II, a general average of 32 % of the fish farmers in all areas were attending each field day. This is a reasonable percentage and could serve as a baseline for future work.

It would be most unlikely that all farmers would be able to attend all field days. There are several reasons why farmers did not attend more. During the impact survey, interviews were made with 42 farmers who had attended 2 or less field days, and comments were made by all interviewed farmers on field day organization. The most common reason given for missing a field day was that they were not informed in time of the date and venue. Other reasons given varied from being too busy, poor timing of the field days with other activities such as working hours for those employed, field days conflicting with funerals or other events, distance, old age or illness, the farmer was elsewhere and not available, and, finally, a lack of interest. If the main reason for poor attendance was lack of information on the date and venue, a major part of the fault lies with the frequent scheduling of the field days, or 2 or 3 per month. This was done largely due to a shortage of time. A better schedule would be 1 field day a month.

3.3 Impact Survey

A total of 269 farms were visited, interviews were completed with 265 persons; 182 were made with the farmer himself, 33 with a family member (either a spouse or a child), and 50 were made with a representative of a women's or youth group. It was possible to interview 84 % of those who had attended 3 or more field days (223 farmers). The remaining 42 interviews were made with farmers who had attended no field days (23) and those who had attended 2 or less (19). This allows a comparison between the two groups: those who attended 3 or more field days, and those who did not.

The data collected during the impact survey was far more reliable and informative than that of the initial survey. The team conducting the survey were better trained and well aware of the reasons for the survey and the necessity of collecting accurate data. There was a wealth of detailed information available covering actual management practices and the knowledge level of the farmers. The primary purpose of this paper is to demonstrate the overall impact of the field day approach to fish farming development.

For the purposes of brevity and clarity, this paper only summarizes the most basic information derived from the questionnaire. For example, several questions were asked on manuring a pond what is the source, amount, and frequency of application. This paper only analyzes the fact, easily observable, if there are or are not traces of manure in the ponds. This would logically indicate that the field day had an impact as the farmer is actually practicing better manuring techniques. Information on other field day topics were analyzed by summarizing the responses; for example if the farmer was able to correctly answer the several questions on oxygen in a fish pond, it was considered that he had understood that field day topic and his level of knowledge on fish farming had increased. Finally, the impact can be measured in signs of physical improvement or expansion of the ponds.

There was very clear evidence that the field day approach had made a very favorable impact on the farming community. This positive impact is noticeable in the increase in the *number* of practicing fish farmers, the physical improvements in existing

ponds, and the very high rate of information absorption of those who attended the field days.

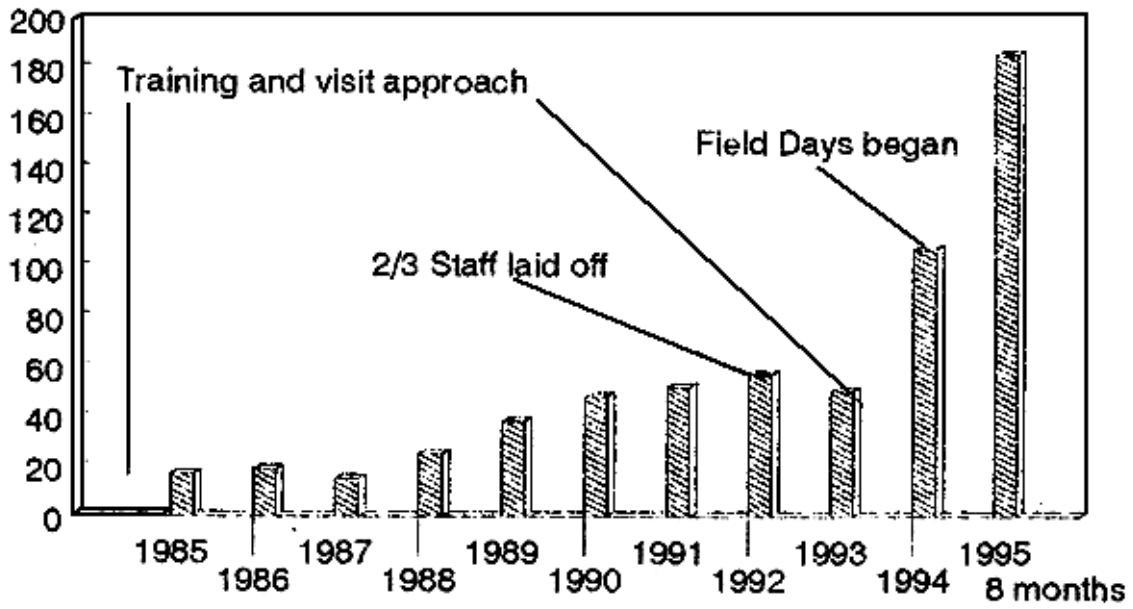
3.3.1 Beginning Fish Farmers

There was the very substantial improvement in the annual rate of increase in new farmers engaging in fish farming for the first time. Prior to the introduction of the field *day* approach, *and for the* 5 year period between 1989 and 1993, there was an average of 49 (min 38, max 57) new fish farmers beginning each year within the sampled areas. The field day approach began in 1994. In that year, 107 farmers began fish farming, roughly doubling the previous average. In the 8 months of 1995, or until the date of this paper, 185 new farmers had begun. Extrapolation to a full 12 months would indicate that the *rate* of increase in new farmers had quadrupled over 2 years.

In the same areas there were 379 farmers in 1993 and by the end of the survey in August 1995, there were 671, or a 77% increase in total numbers of active fish farmers in less than 2 years. This is all the more remarkable if one considers that the extension staff was reduced by 2/3 in 1992 (See figure 2).

Figure 2

Fish Farming Concentration Areas Number Farmers Beginning Fish Farming



3.3.2 Increased Knowledge and Better Management Practices

The poor information derived from the initial survey does not allow a straight forward "before and after" analysis of the impact of the field days on practicing fish farmers. However, given the far better information available from the impact survey, it is possible to compare the level of knowledge, improved management practices, and the physical improvements to the ponds between those farmers who had attended 3 or more field days and those who did not, It was also apparent that there, was a considerable amount of information exchange between farmers, and those who had missed a particular field day were able to get *the* information later from those who attended.

Table IV (following page) presents these basic summaries of responses to questions on specific field *day* topics and the physical signs of improved management, The table compares those farmers who had attended no field days, those who had attended that particular field day, and those who attended 3 or more field days, Finally, to demonstrate the inter-farmer exchange of information, the table includes the responses from those farmers who had missed that particular field day but had attended *at least* 3 other field days in the series.

Table IV demonstrates the very clear differences between those farmers who had not attended the field days and those who did. There is a clear improvement in the knowledge level of the farmers and clear evidence of improved management techniques. From table IV, only 26 % of those farmers who had not attended any field days were manuring their ponds. This percentage increased to 70 % for those who had attended that field day, 67 % for those who had attended 3 field days or more, and to 58 % for those who missed that field day but attended 3 or more others. The same positive trend is clearly visible for all topics.

This analysis is actually rather conservative as several factors make the results appear worse than in fact. Table IV combines the responses of all interviews, yet only 185 were made with the farmer who actually attended the field days, and 33 were made with a family member who had not. Fifty of the interviews were with a member of either a women's or a youth group, the person being interviewed may not have been the same person who attended a particular field day. Including all responses from all interviews gives a better indication of the general impact of field days, if one reduces the questionnaire database to the 185 farmers who actually attended the field days, the correct response rate for each topic increases to between 87 %and 96 %.

Table IV								
Results from the impact survey of field days Correct responses to questions or visible signs of improved management								
Field day topic	Attended no field days		Attended that field day		Attended 3 or more field days		Did not attend that day but 3 or more others	
	Yes	No	Yes	No	Yes	No	Yes	No
Field day 1: Manure								
Signs of manuring	26 %	74 %	70 %	30 %	67 %	33 %	58 %	42 %
Field day 2: Compost crib								
Crib present in the ponds	53 %	47 %	81 %	19 %	77 %	23 %	72 %	28 %
Crib full of compost	9 %	91 %	50 %	50 %	53 %	47 %	33 %	67 %
Field day 3: Pond maintenance								
Pond full of water	56 %	44 %	82 %	18 %	78 %	22 %	73 %	27 %
Grass cut	43 %	52 %	90 %	10 %	87 %	13 %	83 %	17 %
No water weeds in the ponds	52 %	48 %	70 %	30 %	68 %	32 %	67 %	33 %
Field day 4: Tilapia species								
Able to differentiate species	17 %	3 %	77 %	23 %	74 %	26 %	73 %	27 %
Field day 5: Clarias								
Conversant with culture/species	13 %	87 %	77 %	23 %	60 %	40 %	32 %	68 %
Field day 6: Oxygen								
Understands oxygen in fish farming	43 %	57 %	82 %	18 %	74 %	26 %	24 %	76 %
Field day 7: Record Keeping								
Keeps records	13 %	87 %	79 %	21 %	71 %	29 %	35 %	65 %
Field day 8: Sampling								
Understands importance	26 %	74 %	78 %	22 %	74 %	26 %	66 %	34 %
Field day 9: Male tilapia								
Understands the subject	17 %	83 %	79 %	21 %	40 %	60 %	49 %	51 %
Wants to try monosex culture	48 %	52 %	71 %	29 %	69 %	31 %	66 %	34 %
Field day 10: Feeding								
Understands the subject	65 %	35 %	88 %	12 %	87 %	13 %	87 %	13 %
	No attendance		3 field days or more					
Observed by interviewer:	Yes	No	Yes	No				
Signs of pond expansion	4 %	96 %	30 %	70 %				

Signs of pond repairs	17 %	83 %	41 %	59 %	
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Eight out of the 23 farmers who *did* not attend any field days whatsoever had defaulted on a loan from the *project credit* scheme, and they avoided any function where they might expect a reminder to repay their loan, These 8 farmers had previously been trained by the project in formal courses and were visited monthly by extension officers. Their responses positively influenced the data for farmers who had attended no field days. If these are removed from the data base, the difference between those attending field days and those *who did not* is even *more* striking. The remaining farmers had very poor management practices and little idea on the topics discussed, it would be risky, however, to extrapolate from such a limited sample.

Again there were particular situations which negatively influenced the data, The survey team was instructed to mark what was actually taking place at *the* time of the interview. A farmer constructing a new pond may not have yet built a compost crib, although he will in due course. Another farmers ponds may be empty awaiting restocking and there is, at the time of *the* survey, an empty crib and no feeding or manuring. Finally, the survey covered farmers from several ethnic backgrounds speaking several different languages. There were a few inevitable misunderstandings or mis-interpretations.

The above factors could ail combine to make the impact of the field days appear more striking. The purpose here is to describe the general impact of field days, and it is still abundantly clear that the field day approach is effective in imparting correct *information* to large numbers of farmers, and that this information is spread to others. Family members were often capable of answering specific questions, Those farmers who did not attend a particular field day were able to get the information from another, and in surprising detail. There is a considerable amount of inter-farmer, inter-family, and inter-group exchange of information on fish farming *techniques*,

The fact remains that of the global average of aft farmers *in* the 13 areas, only 40% of the existing fish farmers attended 3 or more field days. The sample of those who had not attended any field days would indicate that there was little impact on the 60% who did not. There was a considerable variation in attendance between areas (see Table II and HI above). Those who had attended 3 or more days varied from a high of 89% to a low of 16%. The lowest values were in areas with the highest numbers of farmers such as Rigoma, with 89 farmers and only 17 % attending 3 or more days, and Migori, with 68 farmers and only 16 % attending 3 or more days. These values negatively skew the global average.

Better attendance was found in the areas where the actual number of practicing farmers was fewer, although there is no clear correlation that would indicate the optimum target number. The principle reasons for low attendance have been given above. There may, however, be a need to review the field day approach in terms of numbers of farmers as well as the radius of the areas where they are located.

The question also arises if there were other, non-project related fish farming development activities going on where farmers could have obtained their information and assistance, Government entities such as the Department of Fisheries and non-governmental organizations such as the Peace Corps, YMCA, CARE, missionaries, and others also promote fish farming in Western Kenya. Undoubtedly, their efforts have had a favorable impact on the overall fish farming development effort, This in no way negates the results presented here. These entities were not active in most areas where the field days were held, and where they were present, Department of Fisheries personnel and

representatives of other groups actively participated in the field days organized by the project. The questionnaire asked if the farmers had found field days helpful or not. The response was 97 % favorable.

Another question is the role of formal training done prior to the introduction of *the* field day approach. The previous project had formally trained, in 3 to 5 day residential courses, over 1,300 farmers, women and youth groups in fish farming. These farmers and groups were spread throughout the Western Kenya region, in the areas of the current study, only 12 farmers, or 4.5% had attended such courses before the field days began. Of these 12 farmers, 8 were credit farmers who did not attend any field days, and their lack of correct responses would indicate that the information obtained during the formal courses was not well retained. These are negligible numbers and do not influence the results. Where appropriate, farmers were asked to compare the field days and the formal courses. The response was unanimous; the field days were far more helpful.

3.4 Financial Considerations

The actual cost of conducting a single field day varied between Ksh 2 200 and Ksh 4 000, irrespective of the number of farmers who attended (Ksh 55 - 1 US\$, September 1995). The *average cost per* field day was Ksh 3 200. This includes start travel to and from the site of the field day, refreshments, a token payment to the host, and incentive payments made to the staff. This incentive cost represented roughly 2/3 of the total cost per field day, or Ksh 2.000 per field day.

The total cost of the 140 field days held during the study was Ksh 448,000, there were 1 976 farmer-training days. This gives a cost of Ksh 226 / farmer-training day. In contrast, a formal resident training course costs Ksh 1 100 / farmer - training day. For *the* sake of comparison, if a farmer attends 10 field *day* courses, *the* cost of training him is Ksh 2 260, while a resident course of 4 days, teaching the same material, costs Ksh 4 400. The field day approach cost is about half, and there is clear evidence that the field days had more of an impact than the formal courses.

For planning purposes, it is important to note the significant cost of both of the surveys. The initial survey cost Ksh 80 000, the impact survey cost Ksh 280 000. The two represent 80% of the cost of actually holding the field days.

4 CONCLUSIONS AND RECOMMENDATIONS

One of the keys to develop a sustainable fish farming activity *in* Africa is to impart, to as large a number of farmers as possible, sufficient knowledge on fish farming that they can continue on their own without the close support of an extension service. This study demonstrates that the field day approach can effectively give fairly detailed information to large numbers of farmers in a timely and cost effective way. The field days also work as a catalyst, the increase in the number of farmers beginning fish farming and the 30% rate of farmers expanding their ponds is very positive.

The field day *approach* to fish farming *development appears* to be a viable alternative to the training and visit approach, particularly in Western Kenya. It is particularly effective because of the high population density and favorable geographical and climatic conditions. It may not be feasible in areas where the density is lower and farms are further apart.

The frequency of field days during the study was too rapid, it would be better to hold one field day per month in each area. This would allow better communication of *the time and venue* of each day, and the attendance should improve.

Different areas have different requirements, and field days should be tailored to those specific needs. For example in Funyola, most of the farmers are well advanced and already practice polyculture with Tilapia and Clarias. Their *needs* and interests are *different than those* of Bonjore, where the majority are just now beginning fish farming.

Farmers frequently requested that a document in both English and Kiswahili be given during the field days summarizing the *topic*. This should be done as it would leave material for future reference.

In the areas of the study, the farmers attending *the* field days spontaneously formed one or more loose associations, if carefully nurtured, these associations can evolve into cooperatives or similar organizations, which can further help develop fish farming.

The existing LBDA extension staff can easily expand the field day programme to encompass other areas, A team of two extension officers can conduct 2 to 3 field days a week, each in a different area with a similar 15 km radius, The same officers could then cover a far wider zone.

As a final note, any such training activity may have unintended consequences, and the above effort was not immune. In Yala, the person conducting the field day on compost cribs had simply taken the nearest available wooden stick to demonstrate how to stir the compost. Breaking off *the small branches*, he was *left with a stick of about 1,6 m with a rough fork* at the end. During the impact survey, the team noted that all of the 50 odd ponds visited were equipped with a 1.8 m forked stick, nearly identical to the one chosen haphazardly during the field day. Only on one occasion was such a stick absent. This farmer was then asked what he used to stir the compost. He explained that he could not keep a *wooden* stick at the pond site as it *would* be removed for firewood, but promptly ran home and returned with yet another forked stick, 1.8 m in length.

In this case, the unintended result of all farmers using a uniform tool to stir their compost is harmless, but this antidote demonstrates two important points. Farmers pay *attention, even to the* smallest details. Secondly, what was taught in one field day was quickly spread throughout the farming community.

CONCENTRATION AREA		LOCATION	
INTERVIEWER'S INITIALS		FARMER NAME	
DATE		REF NUMBER	
FIELD DAY ATTENDANCE		SPECIES	TN TZ OTHER T CLAR
1 MANURE	6 OXYGEN	11 FINAL	
2 COMPOST	7 RECORDS		
3 POND MAINTENANCE	8 SAMPLING		YEAR BEGAN/YEARS IN FARMING
4 TILAPIA	9 ALL MALES		
5 CLARIAS	10 FEEDING	TOTAL	

FOLLOWING BASED ON INTERVIEW WITH		FARMER HIMSELF	GROUP MEMBER
FAMILY MEMBER	NO INTERVIEW	OBSERVATION	

FARM DESCRIPTION	POND SIZES		
NO PONDS BEFORE			
NO PONDS AFTER			
ANY SIGN OF EXPANSION?	YES NO		
ANY SIGN OF DIKE WORK?	YES NO		

FIELD DAY 1 MANURE	ATTENDED	YES	NO
QUESTIONS : WHAT COLOUR IS A WELL MANAGED POND?	CLEAR GREEN BROWN		
	WHAT COLOUR IS THE POND?		
	CLEAR GREEN BROWN		
WHAT MANURE DO YOU USE	COW SHEEP PIG	CHICKEN	GOAT

WHEN DO YOU MANURE	DAILY WEEKLY MONTHLY WHEN-EVER	YOU BELIEVE HIM?
		YES NO
HOW DO YOU MANURE	BROADCAST	CRIB

HOW MUCH DO YOU PUT EACH TIME	SHOVELS	SOME CONTAINER
	WHEEL	ESTIMATE AMOUNT

BARROW		
--------	--	--

WHY IS MANURE SO HELPFUL	GREEN WATER	FOOD FOR FISH	
	FERTILIZER	OTHER REASON	

TRACES/SIGNS OF MANURE	YES	NO	(FLOATING ON THE DIKES DO YOU SEE SOME)

FIELD DAY 2 COMPOST	ATTENDED	YES	NO
DID ALL THE PONDS HAVE A CRIB?		YES	NO
DO THEY HAVE CRIBS NOW?		YES	NO
ARE THEY FULL OF STUFF?		YES	NO

WHAT DO YOU PUT INTO THE CRIB	GRASS ROTTING VEGETABLES LEAVES MANURE		
DO YOU STIR IT UP ?	YES	NO	
HOW OFTEN ?	DAILY	WEEKLY	WHEN EVER

FIELD DAY 3 POND MAINENAN	ATTENDED	YES	NO
HOW OFTEN DO YOU VISIT YOUR POND?	DAILY	EVERY FEW DAYS	WEEKLY RARELY
HOW LONG DO YOU SPEND AT THE POND	6 MIN	10 MIN	15 MIN MORE
HOW DEEP SHOULD THE WATER BE?	DEEP AS POSSIBLE		COVER THE BOTTOM

IS THE POND FULL ?	YES	NO
--------------------	-----	----

ANY SIGN OF RECENTLY TRYING TO INCREASE OR REPAIR DIKES DEEPEN THE PONDS?	YES	NO
--	-----	----

IS THE GRASS SLASHED?	YES	NO	WATER WEEDS?	YES	NO
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FIELD DAY 4 TILAPIA	ATTENDED	YES	NO
---------------------	----------	-----	----

WHAT IS THE BEST TILAPIA TO GROW IN WESTERN KENYA?	NILOTICA ZILLI	RENDALLI SPARMANII	DONT KNOW
--	----------------	--------------------	-----------

WHY ?	FAST GROWTH	EATS MANY THINGS	OTHER	DON'T KNOW
-------	-------------	------------------	-------	------------

CAN YOU TELL A NILOTICA ?	SPOT ON DORSAL FIN	COLOUR	DONT KNOW
---------------------------	--------------------	--------	-----------

WHICH GROWS FASTER ?	MALE	FEMALE	BOTH THE SAME	DONT KNOW
----------------------	------	--------	---------------	-----------

MALE OR FEMALE

DOES HE KNOW THE SUBJECT?

YES	NO
-----	----

FIELD DAY 5 CLARIAS

ATTENDED	YES	NO
----------	-----	----

DO YOU HAVE CLARIAS IN YOUR PONDS?

YES	NO
-----	----

IF NOT, WILL YOU TRY TO GET SOME ?

YES	NO
-----	----

WILL YOU CONTINUE RAISING THEM ?

YES	NO
-----	----

WHAT DOES A CLARIAS EAT?

TAD POLES	INSECTS	SMALL FISH	WATER WEEDS	ADDED FEED
OTHER RESPONSES HERE.				

WHY IS CLARIAS GARIEPINUS BETTER?

FAST GROWTH	BIG SIZE	DONT KNOW
-------------	----------	-----------

IF YOU HAVE TILAPIA AND CLARIAS, WHEN DO YOU STOCK THE CLARIAS FINGERLINGS?

SAME TIME	1 MONTH LATER	3 MONTHS LATER	DON'T KNOW.
-----------	---------------	----------------	-------------

DO YOU STOCK BIG CLARIAS WITH SMALL TILAPIA ?

WHY NOT? CORRECT RESPONSE

YES	NO
-----	----

HOWCAN YOU TELL A CLARIAS GARIEPINUS APART FROM THE OTHER ONES AROUND?

SPOTS	NO SMALL FIN BETWEEN DORSAL FIN AND TAIL	HEAD 1/4 BODY LENGTH
-------	--	----------------------

DON'T KNOW

FIELD DAY 6 OXYGEN

ATTENDED	YES	NO
----------	-----	----

DO FISH NEED OXYGEN ?

YES	NO NO IDEA WHAT YOU ARE TALKING ABOUT
-----	---------------------------------------

HOW DO FISH BREATHE?

GILLS	LUNGS DONT KNOW
-------	-----------------

HOW DO YOU TELL THERE IS NOT ENOUGH OXYGEN ?

GULPING AIR	DYING	DON'T KNOW
-------------	-------	------------

WHERE DOES MOST OF THE OXYGEN COME FROM IN A POND ?

PYHTOPLANKTON INLET WATER	SURFACE	DONT KNOW
---------------------------	---------	-----------

WHAT DO YOU DO IF THERE IS NOT ENOUGH QXYGEN ?

ADD WATER	STOP MANURING AND FEEDING
STOP FEEDING	DO NOTHING

WHICH WATER HAS MORE OXYGEN. WARM OR COLD?

WARM	COLD
------	------

DOES HE KNOW THE SUBJECT ?

YES	NO
------------	-----------

FIELD DAY 7 RECORDS

ATTENDED:	YES	NO
-----------	-----	----

DID YOU SEETHE RECORDS?

YES	NO
-----	----

DID HE START KEEPING RECORDS AFTER HEW DAY?

YES	NO
------------	-----------

DID HE IMPROVE RECORD KEEPING AFTER FIELD DAY?

YES	NO
------------	-----------

RECORDS ARE:

POOR	FAIR	GOOD
(STOCKING FEW ENTRIES)	(STOCKING HARVESTING NOTES)	(STOCKING. HARVESTING. FEEDING GOOD COMMENTS. SAMPLING AND ECONOMICS)

FIELD DAY 8
SAMPLING

ATTENDED	YES	NO
----------	-----	----

DOES THE FARMER
SAMPLE?

YES	NO
-----	----

RECORDS TO PROVE IT

YES	NO
-----	----

WHY IS SAMPLING
IMPORTANT

(TICK WHAT THE ANSWERS)

FISH GROWTH	FISH CONIDITION	FISH NUMBERS	PROBLEMS	ADJUST FEED
START SELLING BIG ONES	OTHER..			

HOW OFTEN SHOULD YOU SAMPLE

WEEKLY	MONTHLY	WHEN EVER	DONT KNOW
--------	---------	-----------	-----------

FIELD DAY 9 MALE
TILAPIA

ATTENDED	YES	NO
----------	-----	----

HOW CAN YOU TELL A MALE AND FEMALE. CORRECT ANSWER
WHICH GROWS FASTER MALE OR FEMALE, CORRECT ANSWER:

YES	NO
YES	NO

Second time for this question any not have attended the tilapia field day)

DO YOU WANT TO TRY ALL MALE
CULTURE?

YES	NO
-----	----

CAM YOU SEX YOUR OWN
FINGEPLINGS?

YES	NO
-----	----

FIELD DAY 10
FEEDING

ATTENDED	YES	NO
----------	-----	----

WHAT DO YOU FEED YOUR FISH ON?
TICK WHAT HE ANSWERS

RICE BRAN	WHEAT BRAN	POSHO MILL WASTE
PROJECT FEED	PIG MEAL	DAIRY MEAL
TERMITES	OTHERS PUT HERE	LEAVES

HOW OFTEN DO YOU
FEED?

DAILY	WEEKLY	WHEN EVER	NONE
-------	--------	-----------	------

**TICK WHAT HE
ANSWERS**

YOU BELIEVE HIM?

YES	NO
-----	----

**DO YOU SEE ANY
FEED?**

YES	NO
-----	----

**ANY SIGN OF
FEEDING?**

YES	NO
-----	----

(ON THE GROUND, FEEDING RESPONSE OF FISH)

WHEN DO YOU TELL. IF YOUR FISH HAVE GOT ENOUGH FEED
CORRECT ANSWER:

YES	NO
-----	----

QUESTIONS ON FIELD DAYS

DID YOU FIND FIELD DAYS HELPFUL? YES NO

WHY DIDN'T YOU ATTEND MORE DAYS: TOO BUSY ALREADY KNOW HOW TOO FAR
OTHER REASONS HERE:

WHAT TOPICS FOR FIELD DAYS DO YOU WANT?

WILL YOU EXPAND YOUR FISH FARMING IN. THE FUTURE? YES NO
WHY WHY NOT

GENERAL IMPRESS/ON OF FARM **ABANDONED**

<i>POOR</i>	<i>FAIR</i>	<i>GOOD</i>	<i>EXCELLENT</i>
FEW FISH	COMPOST CRIB	COMPOST CRTS	COMPOST CRIB
NO FEEDING	SOME MANURE	MANURE	MANURE
NO MANURING NO CRIP	SOME FISH	GREEN WATER FEEDING	GREEN WATER FEEDING RECORDS SAMPLING TAKES ADVICE

DID YOU FIND THE FIELD DAYS HELPFUL? YES NO

COMMENTS / OBSERVATIONS

