



Training Report on Fish Feed Handling and Storage Practices



**Council for Scientific and Industrial Research – Food Research
Institute/Water Research Institute**

2018

By

**Amy Atter, Hannah Oduro-Obeng, George Anyebuno, Samuel K.K. Amponsah,
Winnifred Arthur, Isabella Tandoh and Seth K. Agyakwah.**

Table of Contents

Project background	2
New Information	3
Introduction	4
Conclusion	8
Appendix 1	9
Appendix 2	10
Appendix 3.....	13
Appendix 4.....	14

PROJECT BACKGROUND

Aflatoxin in fish feed project is an interdisciplinary project between FRI and WRI estimated to end by December 2018. This project is funded by the CSIR Competitive Research Grant Scheme (CRGS) and the CSIR-Food Research Institute. The project seeks to create knowledge and advance the science around fish feed and farmed fish productions systems. It proposes to build a critical mass of well-informed farmers and consumers all along the fish value chain which in turn will accelerate farmed fish production and consumption promoting health, good nutrition and building livelihoods. The main objective is to determine the biological health consequences of consuming aflatoxin B1 contaminated fish feed on the cultured farmed fish. As part of project activities an initial survey among farmed Nile tilapia fish farmers to establish the status quo and provide background knowledge was undertaken. Subsequently, a report has been written and on this basis, a follow up training on fish feed handling, storage and transportation has been conducted. This report gives a succinct description of the one day training workshop organized by a joint technical team of research scientists from the Food Research Institute and the Water Research Institute under the CSIR.

Expected output and project sustainability

At the end of the study, it is anticipated that, the effect of aflatoxin contaminated feed consumption on fish growth (weight gain or lose, specific growth rate, feed intake, feed conversion ratio and nutritional outcomes will be established. Also, the effect of aflatoxin contaminated feed on microbial quality and safety of farmed fish and feed will be established. Moreover, fish farmers will be trained on good fish feed formulations, handling and storage practices and peer reviewed articles and extension leaflets and manuals will be produced.

New Information

Training objectives

The purpose of the training was to bring together fish farmers from across the country specifically the Eastern and Greater Accra regions of Ghana so as to educate them on the existing fish feed handling and storage, levels of aflatoxins on sampled fish feed as well as to demonstrate how best fish feed is to be handled in order to avoid contamination. The objective was achieved through power point presentations and practical demonstrations.

In addition, the research team provided the participants with materials in the form of flyers which informed them about some recommended practices in their store houses, transportation and receiving of feed, storage conditions, and monitoring as well as hygienic practices expected of fish feed handlers.

The programme for the training is given in Appendix 1. The major issues addressed within the sessions of the programme included;

1. Existing fish feed handling and storage conditions which focused on unhygienic feeding apparatus, bad feed handling practices and congested storage rooms
2. Aflatoxins in feed and feed raw materials which also focused on types of Aflatoxins, health effects of Aflatoxins and dissemination of result from sampled fish feed from fish farms.
3. Best fish feed storage and feeding practices

Key words: Aflatoxins, fish, feed, aquaculture, farmers, training, Akosombo.

INTRODUCTION

On 15th December 2017, a half day workshop was organized which was held at water Research Institute, Akosombo. The team set off from Accra in the morning and arrived in Akosombo at about 9:00am. At about 10:00am all the participants had arrived. A total of 21 participants from across the country took part in the training programme. The programme began with an open prayer by Miss Winifred Arthur, thanking Almighty God and asking him for a successful training. This was then followed by opening remarks by Dr. Seth Agyakwa who stated the purpose of the training and highlighted on how it would be of importance to the participants. He emphasized that, the training would offer them the best handling and feeding practices so as to increase the growth of cultured fish as well as increasing their income. The principal investigator, Mrs. Amy Atter welcomed all participants to the program. She introduced all the facilitators to the participants. She explained to the participants the main purpose of the project and how it was intended to help the farmers benefit from their activities. She urged all participants to take advantage of the training and learn as much as possible.



Mrs. Amy Atter from CSIR- Food Research Institute was the first speaker. She gave a presentation in relation to fish feed storage and handling practices. She focused on existing fish feed handling and storage conditions. She mentioned that, culture of aquatic species forms the basis for food security, enabling the use of cultured fish

Fig. 1 Presentation by Mrs. Atter

as a source of income generation. Hence poor feed storage and handling practices have led to pests, chemical, physical and microbiological contamination. She mentioned unhygienic feeding apparatus as one of the poor conditions exhibited by fish handlers. She explained that, most feeding bowls are not washed after use and are left in the open space which expose it to pests, insects and other contaminants from the environments. Also bad feed packing practices was the second condition she emphasized. She explained that, feeds are kept on bare floor and left opened which causes the feed to absorb moisture and thereby creating enabling environment for mould growth making fish feed prone to aflatoxin contamination.

Thirdly, she emphasized that, feed storage rooms are unhygienic ally kept as rooms appeared very dirty. Leakages and poor ventilated rooms were observed as this will expose feed to rainfall and high temperatures causing spoilage of feeds. Chemicals were also found in storage rooms as this is likely to cause cross contamination. In conclusion, she highlighted that, poor storage and feed handling practices increases the incidence of aflatoxins and other toxins thereby implicating the growth of farmed fishes and fish farming business.



The second presentation was given by Mr. George Anyebuno also from CSIR- Food Research Institute. He spoke on Aflatoxins in feed and feed raw materials. He stated that, these are naturally occurring toxic components in plant foodstuffs which are produced as part of plant defense against bacteria, insects and other threats.

Fig. 2. Presentation by Mr. Anyebuno

These toxic components have negative effect on bio availability of nutrients and causes serious abnormal growth in living tissues. He explained that, aflatoxins as toxins produced by *Aspergillus flavus*, *Aspergillus parasiticus* and lately *Aspergillus nomius* which are prevalent in nuts, cottonseeds, corn, millet and figs. He mentioned that, most animals including humans and poultry are particularly susceptible to aflatoxicosis. Aflatoxins have carcinogenic effect on the liver and kidney. He described the four major designation types of aflatoxins as B1, B2, G1 and G2. He stated that, the most potent carcinogen is AFB1. He showed results of fish feeds sampled from our initial survey that contained some alarming levels of these detected aflatoxins. The results showed total aflatoxins from the range of 0.57 to 93.69ppb from all the feed samples obtained from the various fish farms. In conclusion, he mentioned that, the total aflatoxins detected in most of the feed samples exceeded the acceptable limit determined by European Union (4ppb) and therefore it is likely to affect the growth of the fish as well as livelihood if such fish is consumed.



The final presentation was made by Dr. Seth Koranteng Agyakwa from CSIR- Water Research Institute. He focused on Best Fish Feed Storage and Feeding Practices. He elaborated that, fish farming responds to issues such as food security, employment, livelihood, economic challenges as well as a drive to bridge the deficit in fish supply.

Fig. 3 Presentation by Dr. Agyakwah

He presented statistical data obtained from Fisheries Commission, Ghana (2015) showing the rise of aquaculture in Ghana from the year 2003 (938 tonnes) to 2014 (38535 tonnes). He mentioned that aquaculture is mainly done in ponds, dams and cages. Also, research from 2009 to 2014 shows that, majority of fish farmers grow fishes in cages.

In his presentation, he mentioned reasons for quality, safe and healthy fish. He explained that, fish serves as food and an economic commodity, therefore the quality of fish produced under farming conditions and throughout the whole value chain of getting food to the table should not be compromised with regard to human health. Feed contributes 60% of aquaculture operational cost so there is a need to ensure its safety. He further explained that, poor feed storage, handling and feeding practices may affect fish growth, health and economic value which may lead to biological contaminants such as aflatoxins as well as incidence of chemical contaminants. He gave a list of recommended storage practices in relation to transportation and receiving of feed, storage conditions, general sanitation and feeding practices. Explaining further, he mentioned that, feed should not be transported in open trucks so as not to expose it to water such as rainwater. Feeds received should be cool and dry. He also emphasize on record keeping of feeds received and used as this will help to detect potential disease outbreak at an early stage. In his presentation, he showed pictures recommending the best storage practices which are captured in the flyer given to participants. These practices include adequate ventilation at store rooms in order to maintain ideal temperature and humidity, sacks of feeds should be kept on pallets above the ground as well as away from the walls of storage rooms, feed damaged by moulds should be discarded. In explanation to general sanitation, he focused on good hygienic practices by fish feed handlers and also feeding bowls which should be kept clean. Again he recommended that, protective clothing should be worn before feeding, fish should be fed using blower, feed dispenser or by hands in gloves. In conclusion, he urged fish farmers present to apply the right feed at the right rate, at the right time, to the right fish, in the right environment. He also showed feeding protocol for tilapia and this is captured in appendix 4.

Participants were given the opportunity to ask questions after each presentation. This was followed by closing remarks by Mrs. Amy Atter who summarized the day's activities and encouraged the fish farmers to do their best to handle fish feed in a proper manner so as to avoid any form of contamination. Dr. Seth Agyakwa added on to the closing remarks thanking all participants for their time and presence which made the training a success. The training ended with a group photograph and refreshment.

CONCLUSION

At the end of the day, participants were grateful to the organizers and expressed interest in future workshops which will equip them with the requisite knowledge and skills to propel their fish farming business. Again it is our hope as scientists that solutions to aid in the aversion of public health matters like this would be given all the necessary financial assistance so as to help solve problems of national interest.

APPENDIX 1

LIST OF PARTICIPANTS

Name	Farm	Location	Contact
Samuel Adu Addo	East Allim Aquaculture Association	Bunso junction	0243724449
Stephen Prah	Natog Farms	Tikobo No. 2	0249640418
Emmanuel Tetteh	Tettey Farms	Aiyinase/Ayawora	0502947902
Rev Charles Opoku Safo	R-cos Enterprise	Duayaw-Nkwanta-B/A	0208190268
Clemence T Totsor	Safe Farms	Salo-keta- V/R	0249836272
Paulina Ivy Eva	Paulina and Sons Farms	Wa- UW/R	0207101648
Yaw Adusei	Viculex Fish Farming	Ashanti	0262673902
Issah Adams	Malla Fiah Farms	Ashanti	0542195570
Keita Karifala	-	Greater Accra	0244778998
Albert Ayembono	Rea ponds	Upper East	0244703677
Gabriel Addo	Catfish	Accra	0544231490
Robert Qainoo	Catfish	Cape Coast	0242852351
Godfred T.G Lartey	Catfish/Tilapia	Accra	0244170898
Abambilla L Larry	Catfish	Accra	0243322270
Ekoin Amowih	Catfish	Dunkwa Offin	0245894354
Enoch K. Affreh	Catfish/Tilapia	E/R	0242550764
Mr. Roland Arthur Cudjoe	Catfish/Tilapia	W/R	0203403146
Bright Asare	Catfish Ghana Ltd	Atimpoku/ER	0245993856
Effa Martin	Catfish	Nsoutre-B/A	0207706148
Issac Akortia	S-Hoint	Senchi	0203553735
Brain Kwashie	Catfish/Tilapia	Ho-V/R	0242005189

APPENDIX 2

Pictures of all participants and research Team during Training



Registration of participants



Participants listening attentively to presentations



Presentation by Mrs. Amy Atter



Presentation by Mr. George Anyebuno



Presentation by Dr Seth Agyakwa



Participant asking question after a presentation



Team members packaging food for participants



Some Research Scientists present at the training



Some participants with their lunch package

APPENDIX 3

FEEDING PROTOCOL FOR TILAPIA BASED ON OPTIMAL WATER QUALITY AND WATER TEMPERATURE OF 28 °C (From Coppens Feeds)

INITIAL WEIGHT (GRAM)	FINAL WEIGHT (GRAM)	FEED LEVEL (%BW/DAY)	FEED SIZE (MM)
15	30	4,5	2
30	40	4,0	2
40	50	3,7	2
50	70	3,3	2
70	100	2,9	3
100	150	2,5	3
150	200	2,2	3
200	300	2,0	3
300	400	1,9	3/4,5
400	500	1,7	4,5
500	600	1,5	4,5
600	700	1,4	4,5
700	800	1,3	4,5
800	900	1,2	4,5

Appendix 4

Some questions asked by some participants

- Q1. How and where can you test feed for aflatoxin contamination?
- Q2. What are the individual good practices to observe?
- Q3. Can feed bagged in double layered polyethylene bags be exposed to environmental contamination if not already contaminated?
- Q4. Are alternative storage facilities available to farmers in the fishing communities?
- Q5. When and where will the next training be?

ACKNOWLEDGEMENT

The team is grateful to **CSIR-Competitive Research Grant, CSIR-Food Research Institute and CSIR-Water Research Institute** for their financial support.