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Determining the Level of Application of Hazard Analysis and Critical Control Point (HACCP) Principles in Smoked Fish at Two Fishing Communities in Ebonyi State

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ABSTRACT

The study assessed and determined quality control on species of smoked fish using traditional method in two communities of Iyonu in Ishielu Local Government Area and Oziza in Afikpo North Local Government Area of Ebonyi State. The principles of Hazard Analysis and Critical Control Point (HACCP) was determined by the use of questionnaire administered to forty respondents, interview session was conducted to assess the cooperation and acceptability of HACCP programmes to their processing operation. Frequency table and percentages were used for analyzing processors response. Result indicate that HACCP was not initially applied at the two fishing communities processors accepted the education and programme which was given on the use of HACCP techniques to ensure fish safety and encourage consumer's acceptability.

Key words: HACCP, fishing communities, Ebonyi state

INTRODUCTION

Hazard Analysis and Critical Control Point (HACCP) refers to a system of scientific and systematic identification of specific hazards and measures of control and safety of food. It is a tool for cheering hazards and establishing control systems that adopt prevention rather than the reliance on end-product testing. Its implementation should be secured by scientific evidence of risk to human health. It enhances food and fish safety and provides known benefits such as regular inspection by regulatory authorities and the promotion of internal trade through the increase of confidence in food safety (CAC, 1969a). Successful application of HACCP requires full commitment and involvement by management and work force. This requires inter-disciplinary approach and work private expertise in Veterinary health, Agronomy, Micro-biology, Medicine, Public health, Food technology, Environmental health, Chemistry and Engineering. From the FAO symposium on the significance of fundamental, it is noted that the physiological condition of fish at the time of capture could have a marked effect on the subsequent shelf life of fish and fish products. Processors must comply with legal consideration on food safety at all stage to encourage product acceptability. The local fishery sector which produces the bulk of the smoked fish consumed in Nigeria needs to comply with and apply HACCP principles as it is applicable in developing nations of the world. Since the high ambient temperature encourages proliferation of bacteria, cooling the fish will inhibit multiplication of spoilage bacteria, thereby, extending the shelf life of the fish before these are sold to consumers (Eyo, 1986). Fishermen smoke fish are unable to sell

within 8-12 h after catch and are exposed to high ambient temperature of over 55°C. Such fish have already lost their good organoleptic qualities. Smoked-dried fish found in the market exhibit uniformity in product characteristic. Some smoked-dried fish with low moisture contents, suffer from heavy insect infestation while those not so dried have medium to high moisture contents and suffer from both bacteria attack and mold contamination. The later condition is common in smoked catfish. *Clarias* species contamination with sand and ashes from fire wood are common (Tobor, 1984). Quality Control (QC) began in the engineering industry as a way of regulating production of large members of uniform articles but extended to the food industry. It is not commonly used in fish industry with its use increasing steadily as demand for high quality product increases. Since fish is more variable than most foods, correspondingly greater (Connell, 1980). As customers and government become more particular about their food requirement, it is not to lose out in competition with other food. It is, therefore, important that the principles of quality control become appreciated in the industry (FAO, 1977). Quality control means something more formal, based on written agreed procedures or specification which is designed to reduced mistakes. Quality is controlled by designated trained staff that has clear knowledge of what customer want (Connell, 1972).

GUIDELINE FOR THE APPLICATION OF THE HACCP SYSTEM

Prior to the application of HACCP to any sector of the food chain, sector should be operating according to the codex general principles of food hygiene, the right code of practice and appropriate food safety legislation. Management committee commitment is necessary for implementation of an effective HACCP system. During the application, its analysis should consider fish quality, personnel, environment, processing procedure, packaging and handling of both fresh and smoked fish, clearing and sanitation level, transportation and distribution network. Instances of food-borne illnesses and diseases on the consumption of poorly handled and unhygienic smoked fish has led to the need to encourage food safety and preclude food poisoning. CAC (1969b) reported that the intent of the HACCP is to focus at Critical Control Points (CCPs). Design of the operation should be considered if a hazard which must be controlled is identified but no CCPs are found. When any modification is made in product process or any step, it is important when applying HACCP to be flexible and were appropriate given the content of the application taking into account the nature and size of the operation.

QUALITY CONTROL OPERATION

The difference of Quality Control (QC) depends on the size of the company and the kind of product handled. A small form sending iced fillet to retailers and fingers will require much less sophisticated QC than a large firm making high-priced large prepared frozen fish.

The four main stages, at which QC is applied, can be identified as; drawing up a product specification, inspecting or testing raw materials, processing the raw materials and inspecting or testing finished product.

Therefore, this study is aimed at: (1) Knowing the level of application and utilization of HACCP principles at two major fishing communities, Iyonu and Oziza in Ebonyi State of Nigeria, (2) Educating and encouraging the local fish processors, as well as to ensure the maintenance of good quality fish to increase the safety and acceptability of smoked fish and (3) Reduction of the incidence of fish borne disease in relation to consummation of smoked fish.

STEPS IN HACCP PRINCIPLES

- Conduct a hazard analysis. Determine the Critical Control Point (CCP)
- Establish critical limits. Establish a system to monitor control of CCP
- Establish corrections action to be taken monitoring that indicate a particular CCP under control
- Establish procedures for verification to conform that the HACCP is working correctly
- Establish documentation concerning all procedures and record appropriate to these principle and their application

APPLICATION OF HACCP

When applying HACCP to a given operation, consideration should be given to steps in the sequence of operation. This includes, assembling the HACCP team, describing product, using identity intended, constructing flow diagram, on site confirmation of flow diagram, listing all potential hazard analysis, determining CCPs, establishing critical limit for each CCP, establishing verification procedure and establishing documentation and Record keeping. Hobson and Kay (1979) pointed out possible points to be conducted in the hazard analysis. Likely occurrence of hazard and serenity of their adverse health implication.

Qualitative and quantitative evaluation of the presence of hazards, survival or multiplication of micro-organism of concerned or physical agent. Condition leading to the above. They further stated that, the Quality Control (QC) personal should then conduct analysis to identify the HACCP plain with hazard of such nature that their reduction or elimination to acceptable level of essential to the production of safe food.

MATERIAL AND METHODS

Study area: The fish smoking areas covered in this study were Iyonu fishing community in Ishielu Local Government Area of Ebonyi State and Oziza fishing community in Afikpo North Local Government Area of Ebonyi State, Nigeria. These two communities are located in the Riverine area of the state with a natural vegetation of rain forest.

Sampling procedure: From each of the two communities, a table of twenty respondents was selected. With the rain and increased catch, processors was readily accessible. The data collected was subjected to analysis.

Instrument for data collection: Both primary and secondary data were used for instrumentation of data collection. The primary data was obtained from interview sessions and the use of structured questionnaire.

Statistical analysis: Descriptive statistics such as frequency table and percentage were used for the data analysis.

Enhancement of the study: The period of the year between May and July is during the rains. However, there was an increase in fish catch hence, processors get sufficient supplies. This led to a high number of processors that responded to the questionnaire. The language of communication was a great chance that enhanced free flow of information, since majority of the respondents could comprehend Ebonyi dialect.

Sanitation and personal hygiene: Sanitation of the processing environment, when done, allows the end products to be acceptable to all consumers. It is done by the application of a solution of sanitizers or hot water at about 82°C. Environmental series do much to prevent communicable diseases; ill-health conditions which may occur from food borne disease, the contribution of the individual can not be under estimated. While the sanitation is provided, the personal hygiene must be the result of a definite individual decision which largely depends on training and education (Hobson and Kay, 1979). They suggested that clearing varies from the use of bucket and brush to the sophisticated foam system. The technology allows the detergent and sanitizers to be sprayed over equipment or allowing contact with the chemicals. The workers further maintained that allowing fish handlers entails that they know why it is necessary for the use of appropriate facility in carrying out their processing operation. Thus, promotes good hygiene habits start from raw material to the end-product and marketing.

RESULTS AND DISCUSSION

Table 1 show that 30% of the respondents' age between 31 and 40 year of both communities had the highest percentage of the area of study. Age of 10-20 and 51 and above of the two communities had the lowest percentage of the area of study. Data collected from the two fishing communities indicates that females were the major fish processors, whereas, males do engage in any other job rather than fish smoking. While, 45% of the respondents from Iyonu acknowledged doing other activities. At Oziza, 68.3% of respondents engaged in fish smoking being a business of the community, 31.8% do it for home consumption while at Iyonu where it was 46.8 and 53.2%, respectively. On daily basis smoking of fish is done for 69.7 and 91.4% at Iyonu and Oziza, respectively while on the alternative days it is 20.4 and 12.8%, respectively. Of the 40 respondents, none of the processors got fresh fish supply iced as sensory assessment of fresh fish was done by considering condition of the scales of the eyes, smell of fish, appearance of the belly region and/or finger indication (to assess texture). About 80% of the respondents engaged in finger identification which indicates firmness and elasticity of the skin, 60% used incant cornea, without blood stains and severely smell as indicators of the freshness. The belly region should not appear swollen or discolored. It was observed that, none of the women in Iyonu and Oziza had the knowledge of HACCP principles and analysis on processing operations as stated. Smoking time was found to be a factor of fish species, sizes and quantity of the fish gotten. Though, 50 and 65% smoke about 1500-2500 fishes per batch and 2500-3300 fishes in Iyonu and Oziza, respectively. Fish waste disposal by all respondents at both communities were into the river, both at least 23.2% at Iyonu and 76.8% at Oziza dispose waste indiscriminately. Obviously, clearing of work surface and

Table 1: Age distribution of respondents

Age interval	Iyonu		Oziza	
	Frequency	%	Frequency	%
10-12	1	5.0	2	10.0
21-30	5	25.0	4	20.0
31-40	6	30.0	6	30.0
41-50	4	20.0	5	25.0
>51.0	2	10.0	3	15.0
Total	20	100.0	20	100.0

Table 2: Frequency distribution on species of smoked fish

Species			Iyonu		Oziza	
Scientific name	Local name	Common name	Frequency	%	Frequency	%
<i>Bagus dayad</i>	Arira	Silver catfish	2	10.0	1	5.0
<i>H. branchusbidorsalis</i>	-	Catfish	1	5.0	3	15.0
<i>Clarias anguillaris</i>	-	Mud fish	4	20.0	5	25.0
<i>Heterotis niloticus</i>	Slap water fish	African bony tongue	5	25.0	3	15.0
<i>Hyperopsis bebes</i>	Onuutu	Mormyrid	2	10.0	2	10.0
<i>Hepsetus odoe</i>	Ubaeze	African pike	1	5.0	1	5.0
<i>Malapterus electrus</i>	Eru	Electric catfish	2	10.0	1	5.0
<i>Oreochromis niloticus</i>	Okpo	Tilapia	3	15.0	4	20.0
Total			20	100.0	20	100.0

environment by respondents from the two communities was by the use of water and broom, the use of detergent was not regular as cleaned by the processors. All the respondents from the two communities use untreated wood as indicated, owing to the effect that their vegetation is mostly rain forest, making wood easily accessible. The case of insect attack and mould formation on smoked fish, as hazard was reported by all the respondents from the both communities. The hazard of mould attack on smoked fish in Iyonu frequency resulted from insufficient drying, whereas at Oziza it was attributed to the dampness of the raffia building where the products are stored.

DISCUSSION

Table 2 describes that for Iyonu, fish species smoked were 25.0, 20.0% for osteoglosidae (slap water fish) and mud fish (Arira and Okpo) and electric catfish (Eru) while 5.0% was for catfish (Arira) and African pike (Ubaeze), respectively. At Oziza, fish species smoked were 25.0 and 20.0% for mud fish (Arira) and Tilapia (Okpo), 15.0% for catfish (Arara) and 5.0% were for both silver catfish (Arira) and mormyrid (Onuutu). African pike (Ubaeze) and electric catfish (Eru), respectively. It was observed that majority of the processors smoke Osteoglosid, mud fish and tilapia fish. The respondents were willing to adopt and embrace HACCP principles in their smoking operation which involve using locally fabricated and built mud-type smoking kiln which was cylindrical in shape and constructed from mud bricks. Following the responses from the survey, processors appreciated the use of the modern smoking kiln but would rather stick to the use of the locally made mud-type smoking kiln, the reasons for that were that materials were easily accessible, easy to manage and manipulate, in addition to cost effectiveness. However, Kolawole (2001) stipulated that no matter the degree, local people embrace technological innovation, if they later discover it does not comply with certain aspects of their daily operation and belief they would eventually abandon it.

CONCLUSION

The term Hazard Analysis and Critical Control Point (HACCP) is simply logical, it is a known operation that is internationally adopted. However, it overcomes weakness inherent in traditional inspection. In fisheries, especially fish processing problems like the side effect of the smoke on the health of the processors, lengthy drying periods and low capacity of the processing method have hindered the full utilization of fish resources. The essence of educating processors was to help

reduce the incidence of food borne illnesses and to enhance environmentally sound. Fisheries operation to attain sustainable development and to meet high demand for principles were not known and practiced. The processors accepted the education they were given on the use of HACCP techniques to ensure fish safety and encourage acceptability.

Fish processors should embrace organized HACCP principles and fish technologists with regulatory agencies which should be involved in their education showing practically, how to determine the points. Processing or operational steps that could be controlled to present the hazard(s) or minimize their likelihood of occurrence. Government should provide the fish processors with loans and other basic amenities to enhance good storage and transportation of fish. This would prevent fish spoilage and generally facilitate the business. Adequate water supply should be made available in order to enhance the hygienic status of processing. Indiscriminate waste disposal should be discouraged with the provision of central waste dumping site in both communities.

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