# STARTER CULTURE DEVELOPMENT AND FERMENTATION OF *OREOCHROMIS NILOTICUS* (NILE TILAPIA) PREPARED WITH DIFFERENT MARINATING AGENTS

**BY**

**ABIODUN, SUNDAY OLUSEGUN**
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**(BSc. Microbiology, Bellstech, Ota)**

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## ABSTRACT

Fermentation of fish is meant to extend the shelf life of fish, improve sensory characteristics and enable consumers to access benefiting microorganisms. Dried fermented fish are staple in many cuisines, particular in coastal areas. However, discrepancies in fermentation methods and sensory quality have a substantial impact on consumer's acceptability and food safety. This research aimed to screen for possible isolates that could be used as starter cultures during spontaneous fermentation of *Oreochromis niloticus,* identify the best isolates using morphological, biochemical and molecular techniques, ferment with the selected isolates and to determine sensory acceptability of dried fermented fish. Marinated fish were spontaneously fermented at 10 $^{\circ}C$ for 12 days to isolate starter cultures and determine best fermentation period. Colonies of bacteria isolated with MRS (de Man Rogosa and Sharpe agar) plates during spontaneous fermentation of *Oreochromis niloticus* were characterized, identified and used as starter cultures. Fermented fish were oven dried at 60 $^{\circ}C$ for 12 hours. Proximate analysis of dried fermented fish was done using standard methods. The appearance, aroma, taste, tactile texture, overall acceptability of fermented fish were evaluated. Data were analyzed using one-way analysis of variance, followed by Duncan's multiple range test, $P \leq 0.05$ was considered significant. Results of fermentation period on physicochemical parameters revealed 10 days fermentation period at 10 $^{\circ}C$ was the best as protein content increased from initial 23.05 to 29.03 in corn base fermented fish and 23.86 to 30.83 in cassava base fermented fish. Suspected contaminating organisms were completely inhibited by the activities of the starter cultures; the system became slightly acidic with Total bacteria count (TBC) $7.8\times10^{9}$/cfu and Lactic acid bacteria (LAB) $3.1\times10^{8}$/cfu for corn base while for cassava base, TBC-$1.2\times10^{9}$/cfu and LAB-$2.2\times10^{5}$/cfu for cassava base. Comparative proximate analysis of fresh fish, fermented fish and dried fermented fish showed

protein content of (24.12, 31.92, 30.04 %), Fat content of (2.69, 2.16, 1.88 %), and Ash content of (5.82, 7.23, 9.12 %), respectively. The main and interactive effects of base and isolates on sensory acceptability showed that carbohydrate bases had no significant (P>0.05) effect on fermented fish acceptability. Starter cultures had significant effect on taste (P= 0.004) and aroma (P= 0.009). Combined effect of carbohydrate base and starter cultures had significant effect on appearance (P= 0.002) and aroma (P= 0.004). Sensory attributes revealed that the effects of the three starter cultures on the fermented fish were not significantly different (P>0.05). The selected bacteria isolates were identified as *Lactobacillus pentosus* strain, *Streptococcus thermophilus* strain 1, and *Streptococcus thermophilus* strain 2, respectively. Dried fermented fish had improved values compared with fresh fish in Na (62.80±3.4 vs. 52.50±2.3), and Fe (41.90±6.7) mg/100g. This study demonstrates the potential of these developed stains as starter cultures to improve the quality and nutritional value of fermented *Oreochromis niloticus*.