Uneven medium chain fatty acids and macro molecules

Minimum inhibition concentration of a conglomerate of uneven medium chain fatty acids and macro molecules against common pathogen gram-positive bacteria in tilapia production

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Introduction

Global tilapia production surpassed 7 Mio t in 2025, making it the second most widely farmed group of fish worldwide. The steady growth in tilapia output is driven by semi-intensive and intensive production methods, as the fish are well suited for large-scale aquaculture practices. However, its resistance to pathogens has been questioned. The susceptibility of tilapia to various bacteria is well documented. Pathogen Gram-positive bacteria such as Streptococcus agalactiae and Staphylococcus aureus pose a great danger for the health and productivity in modern tilapia production, as they can lead in infected fish to mortality rates between 80% and 95%. In the past this hazard was controlled by the prophylactic use of antibiotics. How¬ever, aquaculture is viewed critically for its usage of antibiotics, both from consumers and regulatory authorities. As a result, various feed additives have been studied as alternatives. Currently, there is growing inter¬est in natural bioactive compounds, which are characterized by high food safety as well as consumer acceptance.
Medium chain fatty acids (MCFA) can optimize aquaculture production, especially due to improved fish performance and health status. They efficiently support gut health by a strong antimicrobial effect against pathogen bacteria and improving the gut morphology. Data on uneven MCFA are still scarce. This formed the impetus of the trial.

Material and methods

In this in-vitro experiment, a highly concentrated product (pwrPlanz® EMC, ADDCON, hereafter abbreviated as EMC), which consistsofamix¬tureofunevenMCFAandmacro molecules, was subjected to minimum inhibitory concentration (MIC) tests against common pathogenic Gram-positive bacteria in tilapia production. The MIC was tested in the range from 0.01% to 1.00%, expressed as g/kg. The following bacteria strains were used: *Streptococcus agalactiae* – serotype Ib, *Streptococcus agalactiae* – serotype III, both very prevalent in tilapia infections, and a multi resistant *Staphylococcus aureus* (MRSA) strain.



Table 1: Minimum Inhibitory Concentration (MIC) of various tilapia pathogens in-vitro in g/kg

Bacteria	*Streptococcus agalactiae* Ib	*Streptococcus agalactiae* III	MRSA *Staphylococcus aureus*
MIC in g/kg	0.25	0.50	2.5

Results and conclusions

In-vitro antimicrobial MIC-tests showed a strong effect of EMC against the Gram-positive bacteria *Streptococcus agalactiae Ib* 0.25 g/kg, *Streptococcus agalactiae* III 0.50 g/kg and MRSA *Staphylococcus aureus* 2.5 g/kg. (Table 1)
Based on the in-vitro MIC results, EMC can be considered an important tool in any antibiotic reduction strategies for tilapia production – thus supporting sustainable aquaculture approaches. Therefore, the product could be part of the “One Health” concept of the World Health Organization for reducing the risk of Antimicrobial Resistances. However, the achieved results need to be further validated with in-vivo trials.