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Dietary organic acids as feed additive for tilapia (*Oreochromis niloticus)* culture

Introduction

Growing awareness from consumers and producers of aquaculture species has resulted in a demand for responsible and sustainable aquaculture. The regulatory authorities in most exporting countries now focus on the misuse of antibiotic growth promoters (AGP) in aquaculture, while public attention has shifted towards sustainable production methods. As a result, alternatives to AGP have had to be found. Several feed additives, including acidifiers consisting of organic acids and their salts may be promising alternatives to the use of antibiotics in aquaculture feeds.

Material and methods

The inclusion of different organic acid salts in fish diets was tested in tilapia, *Oreochromis niloticus*, under laboratory conditions in cooperation with the Khon Kaen University, Thailand and the Bogor Agriculture University, Indonesia. In Thailand, a total of 300 tilapia, weighing approximately 7 g, were divided equally between 5 different treatments with 3 replicates each. The acidifier treatments (0.5%, 1.0% and 1.5%), containing Ca-formate, Ca-propionate, Ca-lactate, Ca-phosphate and citric acid, were tested against a negative control and a positive control containing an AGP (0.5% oxytetracycline). Fish were fed to satiation two times a day on a pelletized basal diet containing 31% crude protein for a period of 63 days.

Fig. 1 Harvest at a tilapia pond ©K. Kühlmann

In the second experiment in Indonesia, 320 male hybrid tilapia were randomly allocated into 4 treatment groups; negative control and 3 acidifier groups, containing 0.2%, 0.3% and 0.5% potassium diformate KDF (Aquaform®), respectively. Fish were fed 6 times a day over an 85-day trial period. Beginning on day 10, all fish were orally challenged with *Vibrio anguillarum* (10^5 CFU/d) once a day for 20 days.

Results and conclusions

Although no statistically significant differences were observed in the first experiment, fish fed the 1.5% acidified diet had a numerically increased body weight gain (33.56 g) by more than 11% and 2% compared to the negative (30.18 g) and positive controls (32.98 g) respectively, while the 0.5% and 1.0% acidified diets had slightly poorer growth compared to the negative control. Tilapia which received the 1.5% acidifier dosage had furthermore an FCR improved by 3.5% compared to the negative control and by 1.4% compared to the AGP-treated fish. However, tilapia fed the KDF supplemented diets in the second experiment had significant performance increases (Tab. 1).

Table 1: Effects of potassium diformate KDF on growth performance in tilapia challenged with *V. anguillarum* (P<0.05)

	Control	2 kg/t KDF	3 kg/t KDF	5 kg/t KDF
Final weight (g)	218^{a}	258^{c}	246^{b}	252^{bc}
FCR	1.34^{a}	1.23^{b}	1.25^{b}	1.22^{b}
Mortality (%)	33.0^{a}	20.8^{b}	18.4^{b}	11.0^{c}

With the results shown above, it may be stated that the use of organic acid salts in tilapia aquaculture can improve the grow-out period in terms of performance and sustainability. More trials to validate these results are suggested.

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