

Effect of diformates on growth and feed utilization of all male Nile Tilapia fingerlings (*Oreochromis niloticus*) reared in tank culture

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Introduction:

New strategies are required for feed additives in fish feeds, since the EU-ban of feed antibiotics beginning in 2006. Additives of organic acids are mostly used for feed conservation, but also provided additional effects on growth and feed efficiency in animal nutrition. Several assumptions exist according to the mechanisms and quantitative importance of effects of organic acids in fish nutrition. The present study was conducted to examine potassium diformate or sodium diformate when added separately to low fishmeal Tilapia diets.

Material and Methods:

A growth trial (56d) was conducted with all male Tilapia (initial BW 33.9g) making use of the following pelleted basal diet:

25% corn	5% fishmeal	0.25% L-lys-HCl
14% wheat	5% oil (soybean oil:fish oil=1:1)	0.3% DL-Met
30% soybean meal	1% premix (vitamins, trace elements)	1% CMC
15% wheat gluten	1% MCP	ad 100% wheat starch

Diets contained in DM approx. 34% CP, 9% EE, 4% CF and 17.2 gCP/MJ GE. The dietary treatments under study were:

Diet 1	Diet 2	Diet 3	Diet 4
Control	+0.3% K-diformate	+0.3% Na-diformate	+0.5% Na-diformate

All male offspring was obtained according to MÜLLER-BELECCKE and HÖRSTGEN-SCHWARK (Aquaculture 2000, 184, 67-76). Totally eight tanks of a semi-closed recirculating system per diet were utilized (20 fish/tank; 380l/tank). The experiment started following an adaptation period of 2 weeks. Fish were fed by hand feeding up to apparent satiation four times a day. Feed intake was recorded weekly. Pooled samples for each diet (3 fish/tank) were analyzed for body composition. Data analysis utilized an exponential N-utilization model for standardized evaluation of protein quality according to LIEBERT and BENKENDORFF (Aquaculture 2007, 267, 100-110). Data were submitted to ANOVA ($p < 0.05$).

Results:

Results of the study are summarized in the table.

	Diet 1	Diet 2	Diet 3	Diet 4
Feed intake (g/fish)	77.7 ^a ± 2.4	79.8 ^a ± 1.9	78.1 ^a ± 2.1	77.6 ^a ± 1.9
BW gain (%)	155.5 ^a ± 8.8	166.2 ^a ± 7.9	178.3 ^a ± 6.7	165.0 ^a ± 6.6
SGR (%/d)	1.66 ^a ± 0.06	1.74 ^a ± 0.05	1.82 ^a ± 0.04	1.73 ^a ± 0.04
Protein retention efficiency (%) [*]	34.6 ^b ± 0.85	35.7 ^b ± 0.72	39.7 ^a ± 0.29	36.7 ^b ± 0.69
Protein quality (model parameter, relative)	100	103	115	105

^{*}CP-deposition : CP-intake (%)

Conclusions:

- Na-diformate at 0.3% supplementation level improved zootechnical data most pronounced and provided significant effects on protein utilization of Tilapia
- If the observed effect on protein utilization is an digestibility effect only, can` t be concluded from current investigation
- Further studies are needed to verify the mode of action of organic acids in fish diets as well as the potential of organic acids to improve protein utilization in fish
- Additionally, effects when combined with other feed additives need to be verified