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Dietary potassium diformate improves pangasius growth performance, yield

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Fish in the treated group had a statistically greater weight gain than those in the negative control group

Vietnam is the world's leading country in producing the striped catfish (*Pangasianodon hypophthalmus)*. In the past decade, pangasius fillets have been in high demand in European Union countries and hence, intensive striped catfish production increased eightfold from 0.15 to more than 1.25 million metric tons (MT) annually by 2009 in Vietnam's Mekong Delta. This accounts for the highest primary crop production ever monitored: 200-400 MT/hectare/crop.

In 2011, Vietnam's pangasius exports reached a value of $1.8 billion, growing 26.5 percent over the previous year. The striped catfish is now a very popular intensively raised fish species.

However, high stocking densities and suboptimal water quality can impair fish health and growth performance. Growth and health status may be improved through the application of feed additives to high-quality feeds. This management strategy is one of the main factors in the success of pangasius farming in Southeast Asia.

Feed additives can enhance the growth and health of pangasius, which are grown at very high density in Vietnam.

Antibiotic alternatives

Although antibiotics have been used as health and growth promoters in aquaculture, such use is a subject for much debate in the animal-farming and feed industries. Low levels of antibiotics in animal feeds create the possibility of transferring immunity to antibiotics to bacterial pathogens in animals and humans. Countries in the European Union and elsewhere have therefore banned such treatments from livestock production, including aquaculture, unless they are directed by prescriptions. Alternatives to antibiotics are being sought worldwide in a variety of forms.

The first studies that showed organic acids added to diets positively influence animal performance were published more than 30 years ago. Acidifiers consisting of organic acids and their salts present a promising alternative to antibiotic use. They have received much attention as a potential replacement that can improve performance and the health of pigs, poultry and recently, fish and shrimp.

Potassium diformate

At the end of the trial, *Pangasius* in the treated group had greater weight gain than those in the negative control group.

Potassium diformate (KDF), a double salt of formic acid, has been widely tested as a dietary additive in aquaculture. Fish species fed dietary KDF include salmon, rainbow trout, African catfish, European sea bass, Asian sea bass, milkfish and tilapia. KDF has been used in tilapia aquaculture since 2005, and numerous publications on the use of KDF in juvenile tilapia have been published in Europe, the United States and Asia.

The authors analyzed the average effects of KDF supplementation on performance parameters such as feed intake, weight gain and feed efficiency reported in all the published tilapia studies. The final data set of this analysis contained the results of eight published studies, comprising 18 trials with KDF inclusion.

The average level of dietary KDF was 0.41 percent. A 2.1 percent increase in feed intake was found in tilapia that received the feed with KDF ($P = 0.16$). However, based on final weight, the performance of tilapia was significantly increased by 5.6 percent ($P = 0.009$) in the KDF treatments. The feed-conversion ratios of fish fed KDF were also significantly improved 4.5 percent ($P = 0.012$).

However, data on the use of KDF in pangasius aquaculture is still relatively scarce. Adding KDF to diets was expected to improve the health and growth performance of striped catfish, especially under the farming conditions as practiced in Vietnam.

Laboratory trial

An initial laboratory trial set up in Thailand under clean water conditions tested this assumption. KDF was used in a commercial catfish diet at a dosage of 0.2 percent and given to juvenile fish for eight consecutive weeks. Juvenile catfish with an initial body mass of 2.9 grams were stocked in eight 500-L tanks at 100 fish/group. The fish were fed to near satiation three times daily. The experiment used two treatments with four replicates each.

At the end of the trial, pangasius in the treated group had greater weight gain than those in the negative control group – 64.3 versus 63.0 g. Fish in the KDF group also had a better feed-conversion ratio (FCR) of 1.03, compared to 1.05 for the control treatment. There also was a clear tendency toward reduced mortality – by 60 percent (P = 0.12). Furthermore, the fish productivity index (FPI = Weight gain x survival/10 x FCR) was improved by almost 4.8 percent (P = 0.12).

Field trial

To demonstrate the effects of the additive under commercial conditions, a trial was set up in the Mekong Delta in Vietnam. KDF was added to a commercial catfish diet with 26 percent crude protein content at 0.2 percent dosage and given to fish of approximately 154-gram body mass for 16 consecutive weeks in late 2011. Fish were kept and fed according to the normal pond management.

At the end of the trial, pangasius in the treated group had a statistically greater weight gain than those in the negative control group, at 564 versus 630 grams (P = 0.011). Due to the design of the study with one pond control and one pond treatment, no statistics could be carried out on FCR, mortality and FPI. However, those data were numerically improved, in the case of the productivity index by almost 15 percent.

Finally, the carcass yields of pangasius treated with KDF were enhanced highly significantly (P < 0.0001). Data on growth performance and carcass yield are shown in Table 1.

Lückstädt, Growth performance and carcass yield of *Pangasius*, Table 1

	Control	0.2% KDF	P Level
Final weight (g)	712 ± 191	789 ± 180	0.003
Weight gain (g)	564 ± 198	630 ± 178	0.011
Feed-conversion ratio	1.51	1.47	*
Mortality (%)	1.30	1.18	*
Fish productivity index	3,685	4,234	*
Carcass yield (%)	83.2 ± 2.0	89.4 ± 3.7	< 0.0001

* Not determined.br>

Table 1. Growth performance and carcass yield of *Pangasius* reared 16 weeks with or without 0.2% dietary potassium diformate.

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