Mixed-sex Nile tilapia juveniles (7.05 ± 0.14 g) in four replicate aquaria were fed each of the diets supplemented with 0 (control), 0.25, 0.50, 0.75, 1.00, 1.25 and 1.50 % potassium diformate (KDF) twice daily to apparent satiety for 12 weeks. Survival at the end of week 12 did not differ among fish fed different diets. Weight gain and feed efficiency ratio of fish fed the diet with 1.00 % KDF were significantly higher than those fed diets containing 1.25 and 1.50 % KDF but were not different from those fed diets with lower supplement levels (0, 0.25, and 0.75%) of KDF. Dry matter feed intake was highest and lowest for fish fed diets with 0.75 and 1.5 % KDF, respectively. These values were significantly different from those of fish fed other diets. There were no significant differences among hematological parameters (total, red, and white blood cell counts, hemocrit, hemoglobin, mean corpuscular volume, mean corpuscular hemoglobin and mean corpuscular hemoglobin concentration) of fish fed different diets. Likewise, innate immune responses (serum protein, immunoglobulin, lysozyme and alternative complement) did not differ among treatments. Cumulative mortality 14 days post-challenge with S. iniae and post-challenge antibody titer against the same bacterium were also not affected by dietary treatments.

**Objectives**

This study evaluated the effect of various dietary levels of potassium diformate (KDF) on growth performance, feed utilization efficiency, hematology, innate immune response and resistance of Nile tilapia to Streptococcus iniae challenge.

**Materials and Methods**

Mixed-sex juvenile Nile tilapia produced at our laboratory were acclimated to the basal diet for 2 weeks to an average weight of 7.05 ± 0.14 g and randomly stocked into 28, 57-L aquaria at a density of 35 fish per aquarium. Aquaria were supplied with flow-through, dechlorinated, heated municipal water at an initial rate of about 0.6 L/min and increased gradually to about 1.0 L/min by the end of week 10. Water was continuously aerated using air stones. During the trial, water temperature averaged 24.6 ± 0.3 C, and dissolved oxygen averaged 6.4 ± 0.2 mg/L. Photoperiod was maintained at a 12:12 h light:dark schedule.

A basal practical diet was formulated to contain approximately 36% crude protein, 6% lipid and 3200 kJ/kg of digestible energy (Table 1). The basal diet was supplemented with KDF at 0, 0.25, 0.50, 0.75, 1.00, 1.25 or 1.50% at the expense of cellulose. Diets were processed using Hobart mixer and grader and dried at room temperature to a moisture content of about 10%, sieved to appropriate sizes and stored in plastic bags at 20°C throughout the feeding trial. Fish in 4 random aquaria were fed each of the 7 experimental diets twice daily to apparent satiety for 12 weeks and the amounts of diet consumed was recorded daily. Once a week, aquaria were scrubbed and accumulated wastes siphoned. On cleaning days, fish were fed only in the after- noon. Fish in each aquarium were group-weighted and counted at 3-week intervals. Feed was not offered on sampling days.

At the end of the feeding period (week 12), 3 random fish from each tank were bled with heparinized (100 IU/mL) tuberculin for hematological assays (2 determinations/fish) following the methods described by Lim et al. (2009). An additional 4 fish per tank were bled using non-heparinized tuberculin syringes and serum samples collected and stored at -80 °C until used. Serum from each of the four fish per tank was assayed in duplicate for serum total protein, total immunoglobulin, and lysozyme and complement activity using the methods described by Lim et al. (2009).

Twenty (20) remaining fish per aquarium were randomly selected and intra-peritoneally (IP) injected with 0.1 mL of 1x104 cfu/mL of S. iniae (1x103 cfu/fish) to receive their respective dietary treatments. Fish were monitored and mortality was recorded twice daily for 15 days following injection and dead fish removed. Fifteen days after challenge, surviving fish per tank were bled for serum collection for determination of agglutination antibody titers against S. iniae as described by Yıldırım-Aksoy et al. (2007).

Data were analyzed by one-way analysis of variance using the General Linear Model (GLM) of SAS. Duncan’s multiple range test was used to compare treatment means. Differences were considered significant at the 0.05 probability level.

**RESULTS AND DISCUSSION**

There was a trend of increased WG of Nile tilapia with increasing dietary levels of KDF from 0.25 to 1.0%, but levels of 1.25% or higher adversely affected WG and FE. However, dietary inclusion of KDF has no effect on hematological parameters, immune responses and the resistance of fish against S. iniae challenge. The discrepancy among data of published studies on the beneficial effects of inclusion of KDF in tilapia diets may be due to variations among fish species, strain, size or age, levels of inclusion, composition and nutrient content of experimental diets, buffering capacity of dietary ingredients, culture and feeding management, and water quality. It is suggested that more research be conducted to better understand the mechanism of the potential beneficial effects of this compounds in diets of tilapia as well as of other species.

**References**