

Possible use of the new stable form of Kimchi vitamin C (L-ascorbyl-2-glucose) in Korean rockfish diets

X.J. Wang · S.C. Bai · H.K. Jun^{*} · K.W. Kim · I.H. Ok · K.M. Bae^{*}

Department of Aquaculture, Pukyong National University

^{*}Department of Microbiology, Pusan National University

Introduction

Numerous studies have shown that ascorbic acid is an indispensable micronutrient required to maintain the physiological processes of different animals including most of fishes. L-ascorbyl-2-glucose (AA2G) is an α -glucose conjugate of AA on the C-2 position and a newly found AA derivative from Kimchi, Korean traditional fermented vegetable food. AA2G is stable to ascorbate oxidase and heating, it can be effectively hydrolyzed in vitro by the rice seed α -glucosidase. Koreans have had Kimchi for more than one thousand years, it indicates that AA2G is safe to human body. However, the bioavailability test of this new found vitamin C source has not been done in fish.

Korean rockfish (*Sebastes schlegeli*) is a commercially important fish species in Korea; its production ranked the second among the Korean mariculture finfish species. Therefore, the purpose of this study was to compare AA2G with AMP-Na/Ca for supplying the Kimchi vitamin C for juvenile Korean rockfish *Sebastes schlegeli*.

Materials and Methods

Juvenile Korean rockfish (*Sebastes schlegeli*) were obtained from Tong-Yeong, Korea. The feeding trial was conducted in a flow through system with 60-l aquaria receiving filtered sea water at a rate of 1 l/min. Water temperature was ranged from 15 to 23°C following the nature sea water temperature. Experimental fish averaging 3.31 ± 0.02 g (average \pm SD) were randomly distributed into each

aquarium as a group of 20 fish. Each diet were fed to triplicate groups to satiation three times per day at a rate of 4 to 5% of wet body weight. Total fish weight in each aquarium was determined every three weeks, and the amount of diet fed to fish was adjusted accordingly. Treatment effects were considered with the significant level at $P < 0.05$.

Results and Discussion

Results of growth performance are summarized in Table 1. Weight gain, feed efficiency data and improved survival indicate that Korean rockfish can utilize AA2G effectively as a source of vitamin C as well as the AMP-Na/Ca. L-ascorbyl-2-glucose (AA2G) is an α -glucose conjugate of AA on the C-2 position and a newly found AAn derivative from Korean traditional fermented vegetable food-Kimchi. AA2G is chemical stable which is stable to ascorbate oxidase and heating, it can be effectively hydrolyzed in vitro by the rice seed α -glucosidase.

In the present study, the maximum weight gain response to the two forms of ascorbic acid relative to the available amount of vitamin C was similar. From the present results, we can concluded that AA2G is a bioavailable form of vitamin C, and it has the same antiscorbutic activity as the AMP-Na/Ca which is extensively used in aquatic feed industry at present.

Table 1. Growth performance of Korean rockfish fed the experimental diets for 12 weeks

	Diets						
	Control	AMP-Na/Ca 50	AMP-Na/Ca 100	AMP-Na/Ca 200	AA2G 50	AA2G 100	AA2G 200
WG(%)	285.1 ^c	362.8 ^b	436.8 ^a	447.4 ^a	386.9 ^b	440.9 ^a	452.1 ^a
FE(%)	57.4 ^c	70.1 ^b	82.9 ^a	83.3 ^a	71.7 ^b	83.5 ^a	84.2 ^a
HSI(%)	3.76 ^b	4.05 ^b	4.50 ^a	4.16 ^{ab}	3.85 ^b	4.05 ^b	4.10 ^{ab}
CF	1.47 ^b	1.59 ^{ab}	1.63 ^a	1.60 ^a	1.55 ^{ab}	1.57 ^{ab}	1.58 ^{ab}
Hb	5.67	5.60	5.64	5.72	5.74	5.87	5.86
PCV(%)	38.7 ^b	39.0 ^b	40.7 ^{ab}	44.8 ^a	39.2 ^b	39.7 ^b	40.3 ^b
Survival(%)	88 ^b	96.7 ^a	98.3 ^a	98.3 ^a	96.7 ^a	100 ^a	98.3 ^a

¹Values are means \pm SD from four fish where the means in each row with a different superscript are significantly different ($P < 0.05$).