Accepted Manuscript

Synbiotic dietary supplement affects growth, immune responses and intestinal microbiota of *Apostichopus japonicas*

Xitao Wang, Yongxin Sun, Lili Wang, Xiaoyu Li, Kunli Qu, Yongping Xu

PII: S1050-4648(17)30421-7

DOI: 10.1016/j.fsi.2017.07.027

Reference: YFSIM 4709

To appear in: *Fish and Shellfish Immunology*

Received Date: 7 January 2017

Revised Date: 20 June 2017

Accepted Date: 10 July 2017

Please cite this article as: Wang X, Sun Y, Wang L, Li X, Qu K, Xu Y, Synbiotic dietary supplement affects growth, immune responses and intestinal microbiota of *Apostichopus japonicas*, *Fish and Shellfish Immunology* (2017), doi: 10.1016/j.fsi.2017.07.027.

Synbiotic dietary supplement affects growth, immune responses and intestinal microbiota of *Apostichopus japonicas*

Xitao Wang[a], Yongxin Sun[b], Lili Wang[a], Xiaoyu Li[a,c], Kunli Qu[a], Yongping Xu[a,c,*]

[a] School of Life Science and Biotechnology, Dalian University of Technology, Dalian 116024, People's Republic of China.

[b] Dalian Biotechnology Research Institute, Liaoning Academy of Agricultural Sciences, Dalian 116024, People's Republic of China.

c Ministry of Education Center for Food Safety of Animal Origin, Dalian University of Technology, Dalian 116620, People's Republic of China.

[*]Corresponding author: Yongping Xu, School of Life Science and Biotechnology, Dalian University of Technology, No. 2 Linggong Road, Dalian 116024, P. R. China.

E-mail address: wxt731@sina.com.

Abstract

A feeding experiment was conducted to investigate the effects of dietary administration of synbiotic with *Bacillus lincheniformis* WS-2 (CGMCC No. 12813) and alginate oligosaccharides (AOS) on the growth, innate immune response, and intestinal microbiota of the sea cucumber *Apostichopus japonicas* and its resistance to *Vibrio* infection. Sea cucumbers were given a control diet (non- supplemented), pro diet (basal diet plus 1×10^9 cfu (g diet)$^{-1}$ *B. lincheniformis* WS-2), syn diet (basal diet plus 1×10^9 cfu (g diet)$^{-1}$ *B. lincheniformis* WS-2 and 10 g (kg diet)$^{-1}$ AOS) or pre diet (basal diet plus 10 g (kg diet)$^{-1}$ AOS) over a period of 60 days, and the growth performance and various innate immune parameters of the animals were evaluated after 30 and 60 days of feeding. No significant difference in growth performance was observed between the group fed with the syn and the group fed with the pro diet, but both these groups exhibited significant ($P<0.05$) enhancement in growth performance compared to the control group. At the same time, both syn and pro diets also resulted in the animals having significantly higher levels of amylase, protease and alginate lyase activities compared to the con diet. Individuals fed with the syn or pro diet