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## 长期投喂黄芪多糖对黄颡鱼抗氧化及非特异性免疫指标的影响

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### Effect of Astragalus Polysaccharides on Antioxidant and Nonspecific Immune Indices of Yellow Catfish (*Pelteobagrus fulvidraco*) Fed with Different Levels of APS

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摘要

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**摘要** 本文旨在探讨添加不同水平的黄芪多糖(astragalus polysaccharides, APS)对黄颡鱼(*Pelteobagrus fulvidraco*)抗氧化及非特异性免疫指标的影响。选取2龄健康黄颡鱼540尾, 随机分成6组, 每组3个重复, 每个重复30尾鱼, 分别投喂在基础饲料中添加0(对照组)、300、600、900、1 200、1 500 mg/kg黄芪多糖的试验饲料, 试验期为8周。于试验结束后测定黄颡鱼体内超氧化物歧化酶(SOD)、过氧化氢酶(CAT)与溶菌酶(LSZ)活力, 丙二醛(MDA)、一氧化氮(NO)含量, 吞噬细胞的吞噬百分比(PP)、吞噬指数(PI)以及疾病抗性指标。结果表明: 与对照组相比, 300 mg/kg组头肾中以及600、900 mg/kg组肌肉中SOD活力分别提高1.61、1.95与2.08倍, 差异显著( $P<0.05$ ); 600~1 500 mg/kg黄芪多糖能显著提高黄颡鱼心脏、肝脏、脾脏、肌肉与鳃中的CAT活力( $P<0.05$ ), 且各添加组的头肾与中肾中CAT活力均显著升高( $P<0.05$ ); 300~1 500 mg/kg组肝脏与脾脏中, 600~1 500 mg/kg组心脏、头肾、中肾、肌肉与鳃中的MDA含量与对照组相比显著降低( $P<0.05$ )。各添加组的心脏、肝脏、脾脏与头肾中以及600~1 500 mg/kg组的头肾与中肾中NO含量均显著低于对照组( $P<0.05$ )。在0~1 200 mg/kg范围内黄芪多糖添加水平与LSZ活力成正比, 所有组织内LSZ活力较对照组均有显著性地提高( $P<0.05$ )。随黄芪多糖添加水平的升高, 吞噬百分比与吞噬指数显著升高( $P<0.05$ )。黄芪多糖可降低迟钝爱德华氏菌攻毒后鱼的死亡率, 提高免疫保护率, 尤其是1 200、1 500 mg/kg组, 免疫保护率均达到50.0%。由此得出, 在饲料中添加适宜水平的黄芪多糖可促进黄颡鱼抗氧化功能的提升; 饲料中添加黄芪多糖可促进黄颡鱼非特异性免疫功能的提高, 且以1 200 mg/kg添加水平的效果最佳。

**关键词:** 黄颡鱼 黄芪多糖 抗氧化指标 非特异性免疫指标

**Abstract:** This experiment was conducted to investigate the effect of astragalus polysaccharides (APS) on antioxidant and nonspecific immune indices of yellow catfish (*Pelteobagrus fulvidraco*). Five hundred and forty 2-year-old and healthy yellow catfish were randomly divided into 6 groups with 3 replicates per group and 30 fish per replicate. Yellow catfish in the 6 groups were fed basal diets with 0 (control group), 300, 600, 900, 1 200 and 1 500 mg/kg APS, respectively. The experiment lasted for 8 weeks. At the end of the experiment, the activities of superoxide dismutase (SOD), catalase (CAT) and lysozyme (LSZ), the contents of malondialdehyde (MDA) and nitric oxide (NO), phagocytic percentage (PP), phagocytic index (PI), and disease resistance indices were determined. The results showed as follows: compared with the control group, the head kidney SOD activity in the 300 mg/kg APS group and the muscle SOD activity in the 600 and 900 mg/kg APS groups were increased by 1.61 ( $P<0.05$ ), 1.95 ( $P<0.05$ ) and 2.08 ( $P<0.05$ ) times, respectively. The CAT activity in heart, liver, spleen, muscle and gill was significantly enhanced when supplemented with 600 to 1 500 mg/kg APS in diets ( $P<0.05$ ). The CAT activity in head kidney and mesonephros in all APS groups was significantly higher than that in the control group ( $P<0.05$ ). Compared with the control group, the MDA activity in liver and spleen in the 300 to 1 500 mg/kg APS groups and the MDA activity in heart, head kidney, mesonephros, muscle and gill in the 600 to 1 500 mg/kg APS groups were significantly increased ( $P<0.05$ ), while the NO content in heart, liver, spleen and head kidney in all groups and the NO content in head kidney and mesonephros in the 600 to 1 500 APS groups were significantly decreased ( $P<0.05$ ). When supplemental levels of APS ranged from 0 to 1 200 mg/kg, the LSZ activity was proportional to APS supplemental level, and the LSZ activity in all tissues was significantly higher than that in the control group ( $P<0.05$ ). With increasing APS levels, the PP and PI were significantly increased ( $P<0.05$ ). APS could decrease the mortality rate and enhance the protective rate when fish were over attacked with *Edwardsiella tarda*, and the protective rate in the 1 200 and 1 500 mg/kg APS groups reached 50.0%, respectively. It is suggested that proper amount of APS supplementation in diets can enhance antioxidant of yellow catfish; additionally, 1 200 mg/kg APS supplementation has the greatest effects on enhancing nonspecific immunity function of yellow catfish. [ Chinese Journal of Animal Nutrition, 2011, 23 (9) : 1622-1630 ]

**Keywords:** yellow catfish (*Pelteobagrus fulvidraco*), astragalus polysaccharides, antioxidant indices, nonspecific immune indices**基金资助:**

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