



# 动物营养学报

CHINESE JOURNAL OF ANIMAL NUTRITION

首页 期刊介绍 编委会 编辑部 投稿须知 期刊订阅 广告服务 联系我们 留言与回复

动物营养学报 2013, Vol. 25 Issue (9) :2143-2149 DOI: 10.3969/j.issn.1006-267x.2013.09.029

研究简报 Short Communications

最新目录 | 下期目录 | 过刊浏览 | 高级检索

<< Previous Articles | Next Articles

>>

## 酵母铬对尼罗罗非鱼生长和糖代谢的影响

孙敏敏<sup>1</sup>, 刘含亮<sup>1</sup>, 王红卫<sup>1</sup>, 孟晓<sup>1</sup>, 王纪亭<sup>1</sup>, 万文菊<sup>2</sup>

1. 山东农业大学动物科技学院, 泰安 271000;

2. 泰山医学院, 泰安 271000

## Effects of Chromium Yeast on Growth and Glucose Metabolism of Nile Tilapia (*Oreochromis niloticus*)

SUN Minmin<sup>1</sup>, LIU Hanliang<sup>1</sup>, WANG Hongwei<sup>1</sup>, MENG Xiao<sup>1</sup>, WANG Jiting<sup>1</sup>, WAN Wenju<sup>2</sup>

1. College of Animal Science and Technology, Shandong Agricultural University, Tai'an 271000, China;

2. Department of Basic Medicine, Taishan Medical University, Tai'an 271000, China

- 摘要
- 参考文献
- 相关文章

Download: PDF (1416KB) HTML (1KB) Export: BibTeX or EndNote (RIS) Supporting Info

**摘要** 本试验旨在研究酵母铬对尼罗罗非鱼生长性能、血液生化指标、鱼体营养成分以及糖代谢相关基因胰岛素受体(*insulin receptor, IR*)和葡萄糖转运载体(*glucose transporter, GLUT*)表达的影响。选取平均体重为(15.80±0.02) g的尼罗罗非鱼300尾,随机分成4组,每组3个重复,每个重复25尾鱼。以酵母铬为铬源配制4种饲料,以三价铬( $Cr^{3+}$ )浓度计算,其添加水平分别为0(对照)、0.2、0.4和0.8 mg/kg。每组随机饲喂1种饲料。试验期为50 d。结果表明:虽然添加酵母铬对尼罗罗非鱼的生长性能、血液生化指标和鱼体营养成分组成的影响没有达到显著水平( $P>0.05$ ),也没有显著影响肝脏和肌肉中*IR*以及肌肉中*GLUT4*基因的表达( $P>0.05$ ),但0.8 mg/kg组肝脏中*GLUT2*基因表达量显著高于对照组和0.2 mg/kg组( $P<0.05$ )。上述结果说明,添加酵母铬具有上调尼罗罗非鱼肝脏中*GLUT2*基因表达的潜在能力。

**关键词:** 酵母铬 尼罗罗非鱼 生长性能 胰岛素受体 葡萄糖转运载体

**Abstract:** The aim of this study was to evaluate the effects of chromium yeast on growth performance, blood biochemical indices, body nutrient composition and expression of insulin receptor (*IR*) and glucose transporter (*GLUT*) genes which related to glucose metabolism of Nile tilapia. Four diets were supplemented with 0 (control), 0.2, 0.4 and 0.8 mg/kg trivalent chromium ( $Cr^{3+}$ ) in the form of chromium yeast, respectively. A total of 300 Nile tilapia with an initial body weight of (15.80±0.02) g were randomly distributed into 4 groups with 3 replicates per group and 25 fish per replicate. Each diet was randomly assigned to one group. The experiment lasted for 50 days. The results showed that the chromium yeast supplementation did not significantly affect the growth performance, blood biochemical indices and body nutrient composition ( $P>0.05$ ). The *IR* gene expression in liver and muscle, and the *GLUT4* gene expression in muscle were not significantly affected by chromium yeast supplementation ( $P>0.05$ ). However, the *GLUT2* gene expression level in liver in the 0.8 mg/kg group was significantly higher than that in the control group and 0.2 mg/kg group ( $P<0.05$ ). In summary, these results suggest that chromium yeast supplementation has a potential ability to improve the expression of *GLUT2* gene in liver.

**Keywords:** chromium yeast, Nile tilapia, growth performance, insulin receptor, glucose transporter

收稿日期: 2013-04-16;

基金资助:

山东省自然科学基金项目(Y2008D35);山东省高等学校科技计划项目(J09LC05)

通讯作者 王纪亭,副教授,硕士生导师,E-mail: jtwang@sdau.edu.cn; 万文菊,副教授,硕士生导师,E-mail: wjwan@tsmc.edu.cn

引用本文:

孙敏敏, 刘含亮, 王红卫等. 酵母铬对尼罗罗非鱼生长和糖代谢的影响[J]. 动物营养学报, 2013,25(9): 2143-2149

SUN Minmin, LIU Hanliang, WANG Hongwei etc. Effects of Chromium Yeast on Growth and Glucose Metabolism of Nile Tilapia (*Oreochromis*

### Service

- ▶ 把本文推荐给朋友
- ▶ 加入我的书架
- ▶ 加入引用管理器
- ▶ Email Alert
- ▶ RSS

### 作者相关文章

- ▶ 孙敏敏
- ▶ 刘含亮
- ▶ 王红卫
- ▶ 孟晓
- ▶ 王纪亭
- ▶ 万文菊

- [1] SCHWARZ K,MERTZ W.Aglucose tolerance factor and its differentiation from factor 3[J].Archives of Biochemistry and Biophysics,1957,72(2):515-518. [crossref](#)
- [2] SCHWARZ K,MERTZ W.Chromium (III) and the glucose tolerance factor[J].Archives of Biochemistry and Biophysics,1959,85:292-295. [crossref](#)
- [3] EVANS G W,BOWMAN T D.Chromium picolinate increases membrane fluidity and rate of insulin internalization[J].Journal of Inorganic Biochemistry,1992,46(4):243-250. [crossref](#)
- [4] MERTZ W,TOEPFER E W,ROGINSKI E E.Present knowledge of the role of chromium[J].Federation Proceedings,1974,33(11):2275-2280.
- [5] VINCENT J B.The biochemistry of chromium[J].The Journal of Nutrition,2000,130(4):715-718.
- [6] JEEJEEBHOY K N,CHU R C,MARLISS E B,et al.Chromium deficiency,glucose intolerance,and neuropathy reversed by chromium supplementation,in a patient receiving long-term total parenteral nutrition[J].American Journal of Clinical Nutrition,1977,30(4):531-538.
- [7] ANDERSON R A.Chromium and parenteral nutrition[J].Nutrition,1995,11(Suppl.1):83-86.
- [8] YOSHIMOTO S,SAKAMOTO K,WAKABAYASHI I,et al.Effect of chromium administration on glucose tolerance in stroke-prone spontaneously hypertensive rats with streptozotocin-induced diabetes[J].Metabolism,1992,41(6):636-642. [crossref](#)
- [9] CEFALU W T,WANG Z Q,ZHANG X H,et al.Oral chromium picolinate improves carbohydrate and lipid metabolism and enhances skeletal muscle Glut-4 translocation in obese,hyperinsulinemic (JCR-LA corpulent) rats[J].The Journal of Nutrition,2002,132(6):1107-1114.
- [10] DONG F,KANDADI M R,REN J,et al.Chromium (D-phenylalanine) 3 supplementation alters glucose disposal,insulin signaling,and glucose transporter-4 membrane translocation in insulin-resistant mice[J].The Journal of Nutrition,2008,138(10):1846-1851.
- [11] MOON T W.Glucose intolerance in teleost fish:fact or fiction[J].Comparative Biochemistry and Physiology-Part B:Biochemistry and Molecular Biology,2001,129(2):243-249.
- [12] WILSON R.Utilization of dietary carbohydrate by fish[J].Aquaculture,1994,124:67-80. [crossref](#)
- [13] SHIAU S Y,CHEN M J.Carbohydrate utilization by tilapia (*Oreochromis niloticus*×*O.aureus*) as influenced by different chromium sources[J].The Journal of Nutrition,1993,123(10):1747-1753.
- [14] SHIAU S Y,LIANG H S.Carbohydrate utilization and digestibility by tilapia,*Oreochromis niloticus*×*O.aureus*,are affected by chromic oxide inclusion in the diet[J].The Journal of Nutrition,1995,125(4):976-982.
- [15] SHIAU S Y,HY S M.Dietary chromic oxide inclusion level required to maximize glucose utilization in hybrid tilapia,*Oreochromis niloticus*×*O.aureus*[J].Aquaculture,1998,161:357-364. [crossref](#)
- [16] GATTA P P,PIVA A,PAOLINI M,et al.Effects of dietary organic chromium on gilthead seabream (*Sparus aurata* L.) performances and liver microsomal metabolism[J].Aquaculture Research,2001,32(Suppl.1):60-69.
- [17] PAN Q,LIU S,TAN Y G,et al.The effect of chromium picolinate on growth and carbohydrate utilization in tilapia,*Oreochromis niloticus*×*Oreochromis aureus*[J].Aquaculture,2003,225:421-429. [crossref](#)
- [18] MEHRIM A.Effect of dietary chromium picolinate supplementation on growth performance,carcass composition and organs indices of Nile tilapia (*Oreochromis niloticus* L.) fingerlings[J].Journal of Fisheries and Aquatic Sciences,2012,7(3):224-232.
- [19] 潘庆,毕英佐,颜惜玲,等.有机铬对奥尼罗非鱼生长和糖利用的影响[J].水生生物学报,2002,26(4):393-399.
- [20] 刘太亮,蒋明,文华,等.吡啶羧酸铬对草鱼生长和耐糖量的影响[J].华中农业大学学报,2009,28(2):198-201.
- [21] NG W K,WILSON R P.Chromic oxide inclusion in the diet does not affect glucose utilization or chromium retention by channel catfish,*Ictalurus punctatus*[J].The Journal of Nutrition,1997,127:2357-2362.
- [22] 蒋伟明,韩耀全,李大列.不同含量烟酸铬日粮对奥尼罗非鱼的影响[J].西南农业学报,2004,17(2):235-239.
- [23] LAYCHOCK S.Insulin receptor signaling[C]//Encyclopedia of hormones.Austin:Academic Press,2003:368-380.
- [24] SIDDLE K.The insulin receptor and downstream signaling[M]//KUMAR S,O'RAHILLY S.Insulin resistance:insulin action and its disturbances in disease.New Jersey:John Wiley & Sons,2005:61-62.
- [25] HALL J R,SHORT C E,DRIEDZIC W R.Sequence of Atlantic cod (*Gadus morhua*) *GLUT4*,*GLUT2* and *GPDH*: developmental stage expression,tissue expression and relationship to starvation-induced changes in blood glucose[J].Journal of Experimental Biology,2006(209):4490-4502.

- [1] 徐晨晨,王宝维,葛文华,张名爱,岳斌,史雪萍.铜对5~16周龄五龙鹅生长性能、屠宰性能、营养物质利用率和血清激素含量的影响[J].动物营养学报,2013,25(9):1989-1997
- [2] 张世忠,王全溪,王长康,吴南洋,江斌,邵良平.丁氨丙磷溶液对肉仔鸡生长性能和免疫功能的影响[J].动物营养学报,2013,25(9):2111-2117
- [3] 张铁涛,崔虎,高秀华,杨福合,李光玉,邢秀梅.低蛋白质饲料中添加蛋氨酸对育成期蓝狐生长性能和营养物质消化代谢的影响[J].动物营养学报,2013,25(9):2036-2043
- [4] 黄学琴,任周正,曾秋凤,张克英,丁雪梅,白世平,罗玉衡,刘永刚.液态复合酶制剂对肉鸭生长性能及钙、磷代谢的影响[J].动物营养学报,2013,25(9):2082-2090

- [5] 荆祎, 李光玉, 刘晗璐, 杨雅涵, 鲍坤, 李志鹏.不同乳酸杆菌添加剂对水貂生长性能、营养物质消化率、氮平衡及血清生化指标的影响[J]. 动物营养学报, 2013,25(9): 2160-2167
- [6] 叶慧, 郑玲玲, 雷建平, 冯定远, 左建军.25羟基维生素D<sub>3</sub>和1 $\alpha$ 羟基维生素D<sub>3</sub>代替维生素D<sub>3</sub>对42~63日龄黄羽肉鸡生长性能、血清生化指标和胫骨发育的影响[J]. 动物营养学报, 2013,25(8): 1752-1761
- [7] 向泉, 周兴华, 陈建, 黄辉, 李代金, 王文娟, 吴青, 周小秋.饲料脂肪水平对白甲鱼幼鱼生长性能、体组成和血清生化指标的影响[J]. 动物营养学报, 2013,25(8): 1805-1816
- [8] 常启发, 白会新, 石宝明, 单安山, 魏传玉, 于长青, 仝宝生.黄腐酸对生长猪生长性能、血清生化指标、血常规参数和免疫功能的影响[J]. 动物营养学报, 2013,25(8): 1836-1842
- [9] 周明, 刘波, 戈贤平, 谢骏, 万金娟, 崔素丽.饲料维生素E添加水平对团头鲂生长性能及血液和肌肉理化指标的影响[J]. 动物营养学报, 2013,25(7): 1488-1496
- [10] 刘志, 张铁涛, 郭强, 吴学壮, 高秀华, 杨福合, 邢秀梅.饲料铜水平对育成期蓝狐生长性能、营养物质消化率及氮代谢的影响[J]. 动物营养学报, 2013,25(7): 1497-1503
- [11] 张建禄, 余平, 黄吉芹, 吉红, 邱立疆, 杨克.脱脂蚕蛹替代饲料中鱼粉对建鲤生长性能、体成分及健康状况的影响[J]. 动物营养学报, 2013,25(7): 1568-1578
- [12] 吴苗苗, 肖昊, 印遇龙, 李丽立, 李铁军.谷氨酸对脱氧雪腐镰刀菌烯醇刺激下的断奶仔猪生长性能、血常规及血清生化指标变化的干预作用[J]. 动物营养学报, 2013,25(7): 1587-1594
- [13] 肖曼, 高振华, 李兴华, 张少成, 陈训银, 张晓慧, 董爱华, 曹赞, 陈广信.酵母培养物对肉仔鸡生长性能、肠黏膜结构及肠道菌群的影响[J]. 动物营养学报, 2013,25(7): 1624-1631
- [14] 李志华, 付京花, 唐雪莲, 侯梦杰, 吴海斌, 潘庆.维生素E在罗非鱼幼鱼饲料中的应用及耐受性研究[J]. 动物营养学报, 2013,25(7): 1648-1655
- [15] 毛述宏, 林鑫, 杨阳, 林仕梅, 罗琳, 李斌斌.甘露聚糖酶对罗非鱼生长性能、消化代谢和非特异性免疫力的影响[J]. 动物营养学报, 2013,25(7): 1641-1647