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饲料铅污染对蛋鸡生产性能、蛋品质以及抗氧化性能的影响

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Lead Contamination in Feed Affects Performance, Egg Quality and Antioxidant Capaci of Laying Hens

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摘要 本试验旨在研究不同剂量铅对蛋鸡生产性能、蛋品质以及血清、肝脏和肾脏中与抗氧化性能相关指标的影响。选用40周龄生产性能相近的海兰褐蛋鸡576羽,随机分为4组:对照组、试验1组(T_1组)、试验2组(T_2组)、试验3组(T_3组),每组4个重复,每个重复36羽。对照组饲喂基础饲粮,T_1、T_2、T_3组分别饲喂在基础饲粮中添加15、30、60 mg/kg铅的试验饲粮。试验期8周。结果表明:1)各组间产蛋率和料蛋比均无显著差异($P>0.05$),1~8周T_3组平均蛋重显著低于对照组($P<0.05$),1~8周T_1、T_2、T_3组平均日采食量分别较对照组降低了3.72%($P<0.05$)、1.93%($P>0.05$)、3.63%($P<0.05$)。2)与对照组相比,试验组蛋白高度和哈夫单位均有降低趋势,除T_3组蛋白高度($P<0.05$)外均差异不显著($P>0.05$);T_3组蛋壳强度和蛋壳厚度最低,第4周和第8周时T_3组蛋壳强度分别比对照组降低了21.89%、16.84%($P<0.05$);蛋壳厚度的变化趋势与蛋壳强度一致,均随着铅添加量的增加而降低,呈现一定的剂量-效应关系。3)与对照组相比,各试验组血清、肝脏和肾脏中谷胱甘肽过氧化物酶活性均显著降低($P<0.05$);丙二醛(MDA)含量均在一定程度上升高,T_3组血清和肝脏中MDA含量均较对照组显著上升($P<0.05$),各试验组肾脏中MDA含量均显著高于对照组($P<0.05$);血清、肝脏和肾脏中还原型谷胱甘肽含量和总抗氧化能力以及总超氧化物歧化酶活性均呈现降低 趋势。综上所述,饲料中铅污染可以导致蛋品质降低,诱导脂质过氧化作用,降低蛋鸡抗氧化能力。

关键词: 铅 蛋鸡 生产性能 蛋品质 抗氧化性能

Abstract: This experiment was conducted to investigate the effects of lead contamination in feed on performance, egg quality and antioxidant indices in serum, liver and kidney of laying hens. Five hundred and seventy-six 40-week-old Hyline laying hens with the similar performance were randomly allocated to four groups (control group, T_1 group, T_2 group and T_3 group), and every group had four replicates with 36 layers each. Lead was added to the basal diet at 0 (control), 15, 30, and 60 mg/kg, respectively. The experiment lasted for 8 weeks. The results showed as follows: 1) there were no significant differences in laying rate and feed-egg ratio among all groups ($P>0.05$); compared with the control group, the average egg weight in T_3 group was significantly decreased ($P<0.05$) and the average feed intake in groups T_1, T_2 and T_3 was decreased by 3.72% ($P<0.05$), 1.93% ($P>0.05$) and 3.63% ($P<0.05$) from 1 to 8 weeks, respectively. 2) Lead contamination in feed decreased albumen height and Haugh unit to some extent, but there were no significant differences in them compared with the control group except for albumen height in T_3 group ($P>0.05$). Eggshell strength and thickness in T_3 group were both the lowest in all groups. Compared with the control group, eggshell strength in T_3 group was declined by 21.89% and 16.84% at 4 and 8 weeks ($P<0.05$). The variation trend of eggshell thickness was consistent with that of the eggshell strength, and both of them were decreased with the increase of dietary lead level, presenting a dose-effect relationship to some extent. 3) Compared with the control group, glutathione peroxidase (GSH-Px) activity in serum, liver and kidney in experimental groups was significantly decreased ($P<0.05$), and the malondialehyde (MDA) content was increased to some extent with the increase of dietary lead level. The MDA content in serum and liver in T_3 group was significantly higher than that in the control group ($P<0.05$). The MDA content in kidney in experimental groups was significantly higher than that in the control group ($P<0.05$). There was a decreasing trend in glutathione (GSH) content and total antioxidant capacity (T-AOC), as well as superoxide dismutase (SOD) activity in serum, liver and kidney of laying hens. These results indicate that lead can reduce the egg quality, and induce the lipid

peroxidation, furthermore, reduce the antioxidant capacity of laying hens.

Keywords: lead, laying hens, performance, egg quality, antioxidant capacity

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