



**University of Zabol**  
Graduate school  
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Department of Animal Science

Thesis Submitted for the Degree of Ph.D  
In Animal Nutrition

**Nutrigenomic control of aflatoxicosis in an animal model**

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## **Abstract**

Aflatoxins are one of the most important mycotoxins that often lead to poor poultry performance and consequently reduced egg and meat quality. Elimination of aflatoxins formed in contaminated foods is an important aspect of nutritional research. The present study was performed to investigate the effect of tryptophan, melatonin and dimethylglycine on reducing aflatoxin B<sub>1</sub> poisoning on growth performance and expression of interleukin-6 gene in Japanese quail. This study was conducted in two experimental stages, the first stage of the experiment was the production of aflatoxin B<sub>1</sub> toxin. The second phase of this project was carried out at the Special Livestock Research Institute of Zabol University in the poultry unit, which includes 680 seven-day-old Japanese quail chicks in 17 experimental groups with 4 replications, and each replication includes 10 quail chicks. Functional traits (feed intake, weight gain, feed conversion ratio) were measured weekly. RT-PCR was used to evaluate the expression of the interleukin-6 gene. CDNA samples were first evaluated for reference gene expression. The reference gene selected in this study is a beta-actin. The results were analyzed in the form of Central Composite Designs (CCD) with SAS software version 1/9. The results of our study showed that the effect of tryptophan on body weight gain was significant throughout the whole growth period and led to improved body weight ( $P < 0.05$ ). The effect of dimethylglycine, interaction of tryptophan and aflatoxin and the interaction of tryptophan and melatonin on body weight gain in the first week of rearing were significant ( $P < 0.05$ ). Melatonin had a significant effect on feed intake throughout the whole growth period and led to the improved feed intake ( $P < 0.05$ ). Tryptophan had a significant effect on feed intake in the first, second and third weeks of rearing ( $P < 0.05$ ). The interaction effect of aflatoxin and dimethylglycine in the second week of rearing on feed intake was significant and led to the improved feed intake ( $P < 0.05$ ). The interaction effect of melatonin and dimethylglycine had a significant effect on feed intake in the second week of rearing and also the interaction of tryptophan and dimethylglycine on feed intake in the third week of rearing was significant and led to the improved feed intake ( $P < 0.05$ ). The second power of melatonin had a significant effect on the feed conversion ratio in the third week of rearing ( $P < 0.05$ ). The effect of tryptophan and the interaction of tryptophan and melatonin on interleukin-6 gene expression was significant and led to a decreased interleukin-6 gene expression ( $P < 0.05$ ). Melatonin and Dimethylglycine also had a significant effect on interleukin-6 gene expression ( $P < 0.05$ ). The results of the present study showed that dietary supplementation with tryptophan, melatonin and Dimethylglycine reduced the negative effects of aflatoxin B<sub>1</sub> on weight gain, feed intake and decreased interleukin-6 gene expression in Japanese quail.

**Keywords:** Aflatoxin B<sub>1</sub>, Central composite design, Dimethylglycine, Interleukin-6, Japanese quail, Melatonin, Tryptophan