



University of Zabol

Graduate school

Faculty of Agriculture

Department of Animal Science

The Thesis Submitted for the Degree of P.H.D

Title:

**Screening of medicinal plants for aflatoxin Inhibition
properties to use in poultry industry**

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May 2024

Abstract:

Detoxification of contaminated poultry feed is an important method to reduce aflatoxin contamination in the human food chain. The experiment was carried out in two parts. The first experiment was to screen medicinal plants in vitro conditions and select peppermint as the best plant with the highest level of aflatoxin inhibition under field conditions and the second experiment was to evaluate the effects of peppermint powder, essential oil and menthol on performance, carcass components, blood parameters, meat quality, immune response, antioxidant activity, intestinal microbial flora and histology, tibia characteristics, and egg-laying parameters in Japanese quails . A total of 640 seven-day-old Japanese quail were assigned in a completely randomized design as 2×4 factorial arrangement with two levels of aflatoxin (0 and 2.5 mg/kg diet) and four additives (no additive; peppermint powder, 20 g/kg; peppermint essential oil, 800 mg/kg and menthol powder, 400 mg/kg of diet) in 8 treatments with 5 replications and 16 birds each. Peppermint essential oil increased feed intake in aflatoxin-contaminated diets. In diets without aflatoxin, menthol increased weight of birds. Addition of menthol to the aflatoxin-free diet compared to the aflatoxin-contaminated diet had a higher feed conversion ratio. Peppermint essential oil significantly increased the live weight of birds in the aflatoxin-free diet compared to the aflatoxin-containing diet. The relative weight of the liver increased significantly in the diet contaminated with aflatoxin. Menthol and essential oil in birds fed with aflatoxin treatments significantly increased red blood cell and white blood cell counts, respectively ($P < 0.05$). Quails fed with treatment without additives and containing aflatoxin had the highest amount of cholesterol and LDL ($P < 0.05$). cooking and drip loss significantly decreased in the diet containing aflatoxin. meat microbial counts and pH were not significant between experimental treatments. Those birds fed AFB1 contaminated diet with no additives showed the worst liver health status by considering super oxide dismutase ($P = 0.0399$), glutathione peroxidase ($P = 0.0139$), alanine aminotransferase ($P < 0.0001$), and aspartate aminotransferase levels ($P = 0.0512$). Peppermint and its derivatives decreased malondialdehyde, TBRS index and peroxide number in birds. Antibody titer against SRBC and Newcastle was not affected by experimental treatments. Without additive-with aflatoxin treatment showed lower lactic acid bacteria population compared to treatments with aflatoxin along with additives ($P < 0.05$). Villus height was significantly higher in quails fed with essential oil and peppermint powder and aflatoxin-free treatments ($P < 0.05$). The depth of the crypt in the diet containing peppermint essential oil was more than the other treatments. Dietary inclusion of peppermint powder, essential oil and menthol increased the density as well as the tibia's resistance to brittleness. Egg weight, egg length, haugh unit, albumen height, egg shell weight and thickness decreased significantly in diets containing aflatoxin. The amount of toxins in the eggs of birds fed with powder, essential oil and menthol was reduced compared to birds fed with diet without additives. According to these results, mint and its derivatives can be used to reduce the negative effects of aflatoxin in Japanese quails.

Keywords: Aflatoxin, Japanese quails, Screening, Peppermint