UJI *IN VITRO* DAN *IN VIVO BINDING CAPACITY TOXIN BINDER* BERBAHAN *BENTONITE* DAN *CURCUMIN* TERHADAP AFLATOKSIN B_1

Mahmud Aziz Mubarok
21/478106/PT/08935

INTISARI

Aflatoksin B_1 (AFB_1) menjadi ancaman dalam industri pakan dan perunggasan, seperti karsinogenik, hepatotoksik, imunosupresif, sehingga diperlukan mitigasi yang tepat untuk menurunkan dampaknya terhadap ayam petelur. *Toxin binder* menjadi salah satu metode yang banyak digunakan untuk menurunkan toksisitas AFB_1. Penelitian ini bertujuan untuk mengevaluasi kapasitas pengikatan *toxin binder* berbahan *curcumin* dan *bentonite* terhadap AFB_1 secara *in vitro* saluran pencernaan dan *in vivo* menggunakan ayam petelur. Pengujian terdiri dari 7 kelompok perlakuan, dengan 5 ulangan. Perlakuan terdiri atas diet basal dengan penambahan 250 pbb AFB_1 (CTRL); diet basal yang mengandung 250 pbb AFB_1 ditambah 1,5 g/kg TB_1 (LTB_1); LTB (*Low dose toxin binder*): 1,5 g/kg → LTB_1, LTB_2, LTB_3; HTB (*High dose toxin binder*): 3 g/kg → HTB_1, HTB_2, HTB_3. Komposisi TB_1, TB_2, dan TB_3 masing-masing adalah 100% *bentonite,* 90% bentonite + 10% curcumin, dan 80% *bentonite* + 20% curcumin. Pengujian secara *in vivo* dilakukan pada ternak ayam petelur, lalu kapasitas pengikatan diperoleh dari hasil perbandingan antara kadar AFB_1 pada pakan dengan kadar AFB_1 pada ekskreta. Parameter yang diamati pada pengujian *in vitro* dan *in vivo* berupa kapasitas pengikatan *toxin binder* terhadap senyawa AFB_1. Hasil penelitian menunjukkan bahwa bentonite 100% (LTB_1 dan HTB_1) memiliki kapasitas pengikatan AFB_1 yang tinggi baik secara in vitro (85,40–91,64%) maupun in vivo (61,16–61,35%), dengan peningkatan dosis dari 1,5 g/kg menjadi 3 g/kg memberikan efek positif. Penambahan curcumin 20% (LTB_3 dan HTB_3) menurunkan kapasitas pengikatan secara signifikan, baik in vitro maupun in vivo. Namun, kombinasi dosis bentonite tinggi dengan curcumin 10% (HTB_2) menunjukkan hasil terbaik secara in vivo (62,46%), mengindikasikan potensi sinergis dalam dosis yang tepat. Penelitian ini menunjukkan bahwa bentonite 100% memiliki kapasitas pengikatan AFB_1 yang tinggi. Penambahan curcumin menurunkan efisiensi pengikatan, baik secara in vitro maupun in vivo. Peningkatan dosis toxin binder hingga 3 g/kg secara signifikan meningkatkan kapasitas pengikatan AFB_1.

Kata kunci: Aflatoksin B_1, *bentonite*, *binding capacity*, *curcumin*, *toxin binder*

IN VITRO AND *IN VIVO* BINDING CAPACITY OF BENTONITE-CURCUMIN TOXIN BINDER AGAINST AFLATOXIN B_1

Mahmud Aziz Mubarok
21/478106/PT/08935

ABSTRACT

Aflatoxin B_1 (AFB_1) is a threat to the feed and poultry industry due to its carcinogenic, hepatotoxic, and immunosuppressive properties, so appropriate mitigation is needed to reduce its impact on laying hens. Toxin binder is one of the widely used methods to reduce the toxicity of AFB_1. This study aims to evaluate the binding capacity of toxin binders made from curcumin and bentonite to AFB_1 in the gastrointestinal tract *in vitro* and *in vivo* using laying hens. The test consisted of 7 treatment groups, with 5 replicates. Treatments included a basal diet with 250 ppb AFB_1 (CTRL); a basal diet containing 250 ppb AFB_1 with 1.5 g/kg TB_1 (LTB_1); low-dose toxin binders (1.5 g/kg): LTB_1, LTB_2, LTB_3; and high-dose toxin binders (3 g/kg): HTB_1, HTB_2, HTB_3. The compositions of TB_1, TB_2, and TB_3 were 100% bentonite, 90% bentonite + 10% curcumin, and 80% bentonite + 20% curcumin, respectively. *In vivo* testing was conducted on laying hens, and binding capacity was determined by comparing the AFB_1 concentration in feed with that found in the excreta. The parameter observed in both *in vitro* and *in vivo* assessments was the binding capacity of the toxin binder against AFB_1. The results showed that 100% bentonite (LTB_1 and HTB_1) exhibited high AFB_1 binding capacity both *in vitro* (85.40–91.64%) and *in vivo* (61.16–61.35%), with increased doses from 1.5 g/kg to 3 g/kg showing a positive effect. The addition of 20% curcumin (LTB_3 and HTB_3) significantly reduced the binding capacity in both *in vitro* and *in vivo* evaluations. However, the combination of a high bentonite dose with 10% curcumin (HTB_2) showed the highest binding result *in vivo* (62.46%), indicating potential synergy at an optimal dose. This study demonstrates that 100% bentonite has a strong binding capacity against AFB_1. The addition of curcumin reduced binding efficiency in both models, while increasing the toxin binder dose to 3 g/kg significantly improved AFB_1 binding.

Keywords: Aflatoxin B_1, bentonite, binding capacity, curcumin, toxin binder