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Use of bentonite (mycotoxin control)

- **Type of challenge**: Animal welfare.
- **Challenge**:toxicity of mycotoxins.
- **Action:** Protection of the animal from potential negative effects of aflatoxin B1 at levels below the maximum limit.
- **Animal category**: Ruminants, poultry, pigs.
- **Technique**: Addition of feed additive bentonite (Identification number: 1m558 – functional group “Substances for reduction of the contamination of feed by mycotoxins (aflatoxin B1)“) to the compound feed to reduce adverse effects on the welfare of animals of aflatoxin B1 at levels below the legal maximum limit.
- **Mode of action**: Bentonite is binding the mycotoxin in the digestive tract.
- **Potential efficacy:** Adsorption of AfB1varying from 90.0% to 95.3% at pH 5 (in vitro study).
- **Nature of evidence of efficacy**: Peer-reviewed scientific publications (meta-analysis); in vivo studies for ruminants; in-vitro studies for pigs and poultry; EFSA assessment.
- **Factors impacting on efficacy**: Chemical and mineralogical composition of bentonite.
- **Mode of use:** Bentonite mixed with the compound feed at levels up to 2%.
- **Requirements/limitations**: For effectiveness and animal safety, it is prohibited to use bentonite above 2% in the complete feed for the species for which the feed additive is authorised; should not be used with certain coccidiostats; feed with levels of aflatoxins exceeding the maximum permitted levels may not be used even with the addition of bentonite; the substance must be added in a mixture by a registered feed business operator applying HACCP (R183/2005); authorised in organic farming.
- **Economic consequences**: Moderate increase in feed cost. Positively impacts performance (body weight gain, feed intake, and feed efficiency).
- **Other considerations**: Reduces also the carry-over of aflatoxin from feed (AfB1) to milk (AfM1) by up to 26%; has also a potential for binding other mycotoxins (Ochratoxin A, gliotoxin); may cause moderate changes in fat, and protein of milk; increases egg production while yolk colour can be reduced with an increase level of bentonite; higher levels of bentonite affect the feed intake negatively as it absorbs more moisture and resists the flow of digesta through gastrointestinal tract.

- **References**:
  - EFSA (2011). Safety and efficacy of bentonite (dioctahedral montmorillonite) as a feed additive for all animal species. EFSA Journal 2011;9(2):2007. https://doi.org/10.2903/j.efsa.2011.2007
  - Darmawan *et al*. (2023). A Meta-analysis of Bentonite Efficacy on Performance, Carcass Yield, Giblet, and Blood Constituents of Broiler Fed Contaminated Aflatoxin. Journal of Agricultural Science, 29 (2): 395-403, e-ISSN: 2148-9297. https://doi.org/10.15832/ankutbd.970525
  - Darmawan *et al*. (2022). Impact of Bentonite Feed Additives on Laying Hens Performance and Egg Quality: A Meta Analysis. Iranian Journal of Applied Animal Science, (288.6 K), 12, 4, 2022, 647-653. https://www.researchgate.net/publication/366029392
- **Other techniques**: Other substances for reduction of the contamination of feed by mycotoxins authorised as feed additives: Coriobacteriaceaes (tricothecenes), fumonisin esterase (fumonisins).

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