Protective effects of artemisinin and Artemisia annua extracts on clinical caecal coccidiosis in broiler chickens

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Published in:
18th World Veterinary Poultry Association Congress

Publication date:
2013

Citation for published version (APA):
Protective effects of artemisinin and *Artemisia annua* extracts on clinical caecal coccidiosis in broiler chickens

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**Background**

Avian coccidiosis is the most important parasitic disease in poultry production. Intense use of anticoccidials increases the risk of resistance development against these drugs. Combined with increased consumer concerns and a trend towards organic and free range production, the demand for research in the use of natural compounds as an alternative to anticoccidials has increased.

**Aim**

The aim was investigate the protective effect of artemisinin and a dichloromethane extract from *Artemisia annua* in single infection with *Eimeria tenella* (Houghton strain) in broilers.

**Materials and methods**

- Artemisinin and dichloromethane extract from dried leaves of *A. annua*
- Supplemented in the feed to broilers from day 7 of age
  - Artemisinin 100 ppm (Art-100)
  - Dichloromethane extract of *A. annua* 200 and 300 ppm (Ext-200, Ext-300)
- Inoculation with 4000 *E. tenella* (Houghton strain, Isolate K-347-1) at 16 days of age
- Lesion scoring on 5 and 7 days post infection (dpi) as described by Johnson & Reid (1970).
- Determination of oocyst output in caecal content (McMaster method)

**Results**

- Artemisinin has significant protective effect on the severity of the acute caecal lesions caused by *E. tenella* 5 dpi.
- Gross lesions in chickens treated with artemisinin appeared more healed on day 7 post infection compared to untreated infected birds with similar lesion score
- No differences in oocyst output were observed.

**Discussion**

- Artemisinin was demonstrated to have a significant protective effect on the severity of the acute caecal lesions 5 dpi.
  - This is in line with previous reports on the effect of artemisinin on *Eimeria* infections in chickens (Allen et al. 1997, del Cacho et al. 2010)
  - This is the first study evaluating the effect of a dichloromethane extract from *A. annua* and as seen in the figure above, there seems to be a dose dependant correlation with severity of lesions.
- The observations on day 7 is suggestive of an immunomodulatory effect of artemisinin.
  - Histological investigations of the lymphocytic response in the caeca are on-going.
- Further research is needed to fully clarify artemisinin and its derivatives as a potential coccidiostatic candidate.

**Conclusions**

- Artemisinin has a positive effect on the course of caecal clinical coccidiosis in broilers, seen as a reduced severity of the lesion.
- The results suggests that artemisinin has an immunomodulatory effect.
- Artemisinin should be investigated further for its potential role as a substitute for the commonly used coccidiostats in the broiler production.

**References**


del Cacho et al., 2010. Effect of artemisinin on oocyst wall formation and sporulation during *Eimeria tenella* infection. Parasitol. Int. 59, 506-511.

Johnson & Reid, 1970. Anticoccidial Drugs - Lesion Scoring Techniques in Battery and Floor-Pen Experiments with Chickens. Exp. Parasitol. 28, 30-36

**Key words**: *Eimeria tenella*, artemisinin, broilers