

## INTRATRACHEAL INFECTION OF CHICKENS WITH SPORULATED OOCYSTS OF *EIMERIA TENELLA*

A. ŠANDA, SALMAN AL SAID

Department of Diseases of Poultry, Fish, Game and Bee University of Veterinary Science,  
612 42 Brno

Received July 6, 1978

### Abstract

Šanda A., Salman Al Said: *Intratracheal Infection of Chickens with Sporulated Oocysts of Eimeria tenella*. Acta vet. Brno, 47, 1978: 185—187.

Experiment involving 16 treated and 10 control chickens, aged 3 weeks, was conducted to study the intratracheal route of infection by sporulated oocysts of *Eimeria tenella*.

In the experimental birds a surgical procedure was conducted to prevent ingestion of the expectorated oocysts. The birds were then intratracheally inoculated with 80 000 sporulated oocysts of *E. tenella*. The same amount of oocysts was given to the control birds per os.

Five days post infection the chickens were killed and their intestines dissected. Occurrence of pathological changes in caecal mucosa was observed along with microscopical determination of schizonts in swabs from the mucosa and histological examination of the caecal wall. On the basis of our results it can be concluded that after the intratracheal infection with sporulated oocysts of *E. tenella* coccidiosis occurred in 40.3 per cent of the experimental birds.

*Coccidiosis, parenteral infection, histological changes, caecum, trachea.*

Under natural conditions coccidiosis occurs after swallowing of sporulated oocysts with food. Along with this classical route of infection also the parenteral one has been successfully employed (Sharma and Reid 1962; Davies and Joyner 1962; Sharma 1964; Long and Rose 1965). Intravenous, intramuscular, intraperitoneal and subcutaneous infections were reported. Via the blood stream the sporozoites reach their respective final destination in the intestinal segments and cause pathological changes typical of the parasite species.

According to data in literature the success of parenteral invasion depends upon the number of inoculated oocysts which should be the doubled peroral dose to cause the same changes in the intestinal mucosa.

Although successful cultivation of *Eimeria tenella* on tissue cultures from bovine tracheal cells was reported (Hammond and Fayer 1968; Matsuoka, Callender and Shumard 1969), no data on intratracheal or transpulmonary infection with *Eimeria* spp. in chickens were found.

The aim of our work is to investigate the transpulmonary route of infection with sporulated oocysts of *E. tenella* in chickens by means of aerosol. This way of infection could prove helpful in immunization of chickens against coccidiosis. The present experiment was designed to follow the occurrence of coccidiosis in chickens given the sporulated *E. tenella* oocysts via the trachea into the lungs.

### Materials and Methods

In the experiment 16 Shaver cockerels aged 3 weeks were employed. In the preliminary experiment 0.3 ml of water solution of methylene blue was administered into the trachea of chicks by a polyethylene tube. After one hour the chickens were killed and necropsied. The methylene

blue solution penetrated the primary and secondary bronchi and stained approximately one tenth of the lungs. The stain was also found in oesophagus and glandular stomach.

In order to prevent the experimental birds from swallowing the expectorated oocysts, a tightly fitting plastic tube was introduced into the oesophagus. The position of the tube was ensured by a suture. The tube protruding several cm from the beak was used for artificial feeding of the bird during the 5-day-long experiment. After this procedure, performed in all 16 birds, the chicks were treated with 0.2 ml suspension containing 80 000 sporulated oocysts of *E. tenella*. The same amount of oocysts was given per os to the ten control birds.

Five days post infection the chickens were killed and necropsied. Histological examination of their intestinal wall and microscopical examination of mucosal swabs for the presence of schizonts were made.

## Results

Evaluation of our experimental material has shown that the intratracheal infection with sporulated oocysts of *E. tenella* was successful in 40.3 % of experimental chickens. In these birds fully developed coccidiosis was diagnosed on the basis of pathological changes of their caecal mucosa and schizonts present in mucosal swabs.

## Discussion

Both *E. tenella* and *E. bovis* were successfully cultivated on tissue cultures from bovine tracheal cells. After the intratracheal administration of oocysts no developmental stages of *E. tenella* were found in the tracheal mucosa of chickens by means of indirect immunofluorescence. On the basis of the fact that schizonts of the second generation were detected in caecal mucosa it can be assumed that the sporozoites penetrate actively through the mucosa into the blood stream to be brought to the caecum. After intravenous injection found Sharma (1964) free sporozoites in the lungs of chickens. As in literature no data on occurrence of caecal coccidiosis after intratracheal infection of chickens with sporulated *E. tenella* oocysts were found, the present results demonstrated this new route of infection and can serve further development of prevention and eradication of fowl coccidiosis.

### Intratracheální infekce kuřat oocystami *Eimeria tenella*

Byly provedeny pokusy, při nichž byla stěna jícnu připevněna chirurgickým zákrokem k plastické trubici zasunuté do jícnu, která po provedeném zákroku vyčnívala několik centimetrů ze zobáku kuřete. Trubice sloužila k umělé výživě kuřete během pokusu a zabraňovala polknutí z plic vykašlaných oocyst. Po zavedení trubice bylo pomocí sondy vstříknuto do trachey 80 000 sporulovaných oocyst *Eimeria tenella*. Tentýž den bylo kontrolním kuřatům aplikováno per os stejné množství oocyst *Eimeria tenella*. Za 5 dní po infekci byla kuřata zabita a byly zjišťovány patologickoanatomické změny na sliznici slepých střev. Současně byla ve stěrech sliznice zjišťována mikroskopicky přítomnost schizontů a provedeno histologické vyšetření stěny střevní.

Na základě výsledků pokusu lze konstatovat, že po provedené intratracheální infekci sporulovanými oocystami *Eimeria tenella* se podařilo vyvolat kokcidiózu u 40,3 % pokusných kuřat.

### Интратрахеальная инфекция цыплят ооцистами *Eimeria tenella*

Проводились опыты, в ходе которых стена пищевода была хирургическим вмешательством прикреплена к задвинутой в пищевод пластмассовой трубке, которая после вмешательства выходила на несколько сантиметров из клюва цыпленка. Трубка была предназначена для искусственного питания цыпленка в ходе опыта и препятствовала поглощению выделенных из легких ооцист. После ввора трубки было в трахею впрыснуто с помощью зонда 80 000 спорулированных ооцист *Eimeria tenella*. В тот же день вводилось перорально контрольным цыплятам одинаковое количество ооцист *Eimeria tenella*. Через 5 дней после инфекции цыплята были умерщвлены и выявлялись патолого-анатомические изменения на слизистой слепых кишок. На мазках слизистой слепых кишок. На мазках слизистой одновременно проводилось микроскопическое выявление наличия шизонтов и проводились гистологические обследования стенок кишки.

Исходя из результатов проведенных опытов, можно сказать, что после проведенной интратрахеальной инфекции спорулированными ооцистами *Eimeria tenella* удалось вызвать кокцидиоз в 40,3 % подопытных цыплят.

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