

## EFFECT OF *EIMERIA ACERVULINA* ON INTESTINAL DIGESTION IN CHICKEN

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Received: 26/1/1993

### SUMMARY

The present study was carried out to clarify the effect of *Eimeria acervulina* on PH values of different parts of small intestine as well as the activities of trypsin, amylase and lipase enzymes of intestinal contents. Sixty, 15 day old coccidia-free White Leghorn chickens were used. The chickens were divided into two groups. The first group (20 chicken) was kept as non-infected control. The second group of (40) chicken was infected with 50000 sporulated oocysts of *Eimeria acervulina* per chick.

The results indicated the following findings and conclusion:

1. The PH values of, duodenal and jejunal of infected chickens showed significant decrease than control ones, while there was no significant variation in PH values of ileal contents.

2. Tryptic, amylolytic and lipolytic activities in duodenal and jejunal contents of infected group with *E. acervulina* recorded a significant decrease than their respective control. The activities of the previous enzymes of the ileal content of infected chicken showed no significant differences as compared with control ones.

It is concluded that *E. acervulina* infection inhibit the digestive enzymes and processes of digestion in the small intestine.

### INTRODUCTION

Coccidiosis is caused by protozoan parasites of the genus *Eimeria* multiple in the intestinal tract and cause tissue damage with resulting interruption of feeding and digestive processes or

nutrient absorption, dehydration, blood loss and increased susceptibility to other disease agents (Long, 1987).

The main lesions with *E. acervulina* infection are seen in the upper small intestine of chicken, which are associated with villous atrophy and increased cellularity of the lamina propria (Fernando and McCraw, 1973). The lesions are accompanied by an increased rate of epithelial cell turnover and shortened crypt cell generation cycle (Fernando and McCraw, 1977), in an ultrastructural study of infected villous epithelial cells.

Humphrey and Turk (1974) observed centrioles in epithelial cells of the middle third of the villi during the recovery period, indicating rapid epithelial cell turnover. They suggested that the observed mitochondrial abnormalities in *E. acervulina* infestation may indicate that an oxidative phosphorylation uncoupling toxin is released as a result of the infection.

Sharma and Fernando (1975) found vesicles that have the appearance of lipid accumulations in infected cells. These vesicles are an indication of the malfunctioning of intracellular transformations of absorbed fatty acids, monoglycerides and diglycerides.

Yvone et al. (1972) reviewed the effect of infections due to *E. acervulina* ascribing pathogenesis to two basic effects, namely, a modification of intestinal structure and activity leading to disturbances of absorption and permeability, and an indirect effect resulting in reduced feed and water consumption.

epithelial cells in both duodenum and jejunum and remained more acidic than normal.

Concerning the effect of *E. acervulina* infection on tryptic, amylolytic and lipolytic activities of duodenum, jejunum and ileum of chickens, the obtained results showed significant decreased activities of the previous enzymes in duodenum and jejunum, than the respective control, while there is no significant variation in the activities of trypsin, amylase and lipase of ileal contents. Such drop in the digestive enzymatic activities in duodenum and jejunum could be attributed to the destruction of the intestinal mucosa and glandular necrosis of the submucosa induced by *E. acervulina* infection, such damage decreases the production of pancreozymin hormone which is followed by decrease in the secretion and the activities of trypsin, amylase and lipase in duodenum and jejunum in which the parasite is located.

Another explanation for the reduction of the activities of trypsin, amylase and lipase enzymes might be secretion of antienzymes by the presence of the *E. acervulina* in the duodenum of infested chickens. These antienzymes could have an inhibitory effect upon their host's digestive enzymes. This consideration appeared to be in agreement with that recorded by Chappell (1980).

A third explanation for the decreased digestive enzymatic activities in the duodenum and jejunum may be due to the increased acidity in their contents due to *E. acervulina* infection. Therefore it causes change in the optimum PH for working of each enzyme.

## REFERENCES

- Chappell, L. H. (1980): Physiology of parasites, 1st Ed., Blackie, Glasgow and London.
- Erlanger, B. F., Kokowsky N. and Cohen, W. (1961): Colorimetric method for trypsin determination in duodenal fluid. Arch. Biochem. 95: 271-274.
- Fernando, M. A. and McCraw, B. M. (1973): Mucosal morphology and cellular renewal in the intestine of chickens follow a single infection of *Eimeria acervulina*. J. Parasitol. 59: 493-501.
- Fernando, M. A. and McCraw, B. M. (1977): Changes in the generation cycle of duodenal crypt cells in chickens infected with *Eimeria acervulina*. Z. Parasitenkd. 52: 213-218.
- Humphrey, C. D. and Turk D. E. (1974): The ultrastructure of chick intestinal absorptive cells during *Eimeria acervulina* infection. Poultry. Sci. 53: 1001-1008.
- Long, P. L. (1987): Coccidiosis in Poultry. Critical Review in Poultry Biology 1, 25-50.
- Reid, W. M. and Johnson, J. (1970): Pathogenicity of *Eimeria acervulina* in light and heavy coccidial infections. Avian Dis. 14: 166-177.
- Sharma, V. D. and Fernando, M. A. (1975): Effect of *Eimeria acervulina* infection on nutrient retention with special reference to fat malabsorption in chickens. Can. J. Comp. Med. 39: 146-154.
- Smith, B. and Roe, J. (1957): A micromodification of the Smith and Roe method for the determination of amylase in body fluid. J. Biol. Chem. 227: 357-362.
- Yvore, P., Dubois, M., Sauveur, B. and Aycardi, J. (1972): Pathogenie de la coccidose duodenale a *Eimeria acervulina*. Ann. Rech. Vet. 3: 61-82.
- Ziegenborn, J. (1979): Determination of lipase in serum. Clin. Chem. 25: 1067-1081.