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Sources and Routes of Introduction of *Eimeria* Oocysts into Broiler Chick's Houses

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Abstract: Coccidiosis in chickens is one of the major problems of poultry industry that is caused by protozoan parasites of genus *Eimeria*. It is responsible for significant economic losses to the worldwide poultry industry. *Eimeria spp*. oocysts can be spread to poultry houses by mechanical routes such as boots, dust, cloths, wheels, contaminated equipments and personnel. The objective of present study was to determine which of the above-mentioned parameters is more important. For this purpose a total of 480 samples were collected from litters, workers' hands and boots, wheelbarrows, dust around the houses, feed ingredients and stacked limes situated in front of houses in 5th week of rearing period. The samples were taken from 60 houses related to 30 broiler farms, which were not vaccinated against Coccidiosis. Based on the presence of *Eimeria* oocysts, the results indicated that dust around the houses, boots, wheelbarrows, litter, feed ingredients and workers' hands identified to be contaminated with *Eimeria* oocyts were in 39 (65%), 31 (51.7%), 27 (45%), 23 (38.3%), 10 (17%) and 5 (8.3%) cases respectively. In samples taken from stacked limes, *Eimeria* oocysts were not observed in any cases.

Key words: *Eimeria*, Oocyst, transfer routes, broiler chicken

Introduction

Avian Coccidiosis, an intestinal disease caused by protozoan parasites of genus *Eimeria*, occurs through out the world. It is considering one of the most economically important diseases of domestic poultry that is responsible for significant economic losses in excess of US $ 3 billion annually to the worldwide poultry industry (Williams, 1999). In domestic fowl seven *Eimeria* Specious with different pathogenicity are recognized of which *E. brunetti*, *E. maxima*, *E. necatrix* and *E. tenella* are the most pathogenic, but *E. acervulina* and *E. mitis* are mildly pathogenic, whilst *E. praecox* is regarded as the least pathogenic (Nowzari *et al*., 2005). But during the course of natural infection, several species of *Eimeria* occur concomitantly (Thebo *et al*., 1998).

Coccidia infections are controlled mainly through the use of chemotherapeutic agents. But recurrent and prolonged use has lead to development of multi drug-resistant strains (Grief *et al*., 1996). This phenomenon has caused renewed interests in the development of vaccines, either live or attenuated as an alternative means to control Coccidiosis (Barta *et al*., 1998; Shirley, 1989; Lee, 1993). Oocyst is the most resistant stage of the *Eimeria* parasites life cycle (Karim *et al*., 1996). The wall of oocysts provides an effective protective barrier against the extremes of pH, the action of the detergents and enzymes (proteolytic, glycolytic and lipolytic), mechanical disruption and reagents such as sodium hypochlorite and dichromate (Ryley, 1973). Because of these characters, *Eimeria spp*. Oocysts can be spread to broiler houses mechanically by many routes such as boots, dust, cloths, wheels, contaminated equipments and personnel who move between pens, houses or farms (Long and Rowell, 1975).

In Iran, the broiler industry has been developing rapidly in recent years. The broiler chickens are mostly reared in a deep-litter system and Coccidiosis has become a serious problem in spite of continuous use of anticoccidials as food additives (Razmi and Kaleideri, 2000). Because of importance of *Eimeria* infections to poultry global industry, the purpose of the present study was to determine which of the above-mentioned mechanical parameters is more important for entering the oocycts to broiler chicks' rearing houses.

Materials and Methods

From July to September 2005, a total of 480 samples were taken from 60 houses related to 30 broiler farms at suburb of Amol (a city in the northern Iran), which were not vaccinated against Coccidiosis. Samples were collected from litters, workers' hands, boots, wheelbarrows, dust around the houses, feed ingredients and stacked lime in front of houses in 5th week of rearing period (each mentioned item was consist of 60 samples).

Litter sampling was done according to the method described by Long and Rowell (1975). Areas around water sources were avoided for litter collection. Hands washing and nails brushing was performed for taking

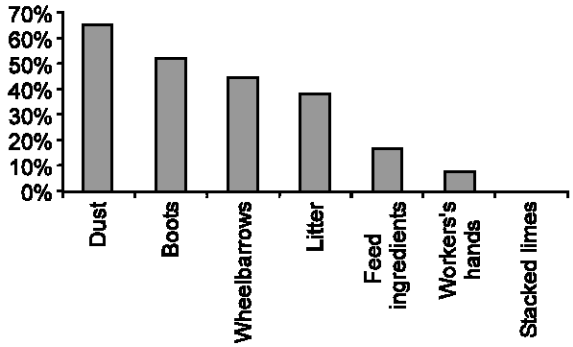

Fig. 1: The percents of *Eimeria* oocysts those were present in study items

samples from workers' hands. For boots sample collection, adhesived materials of under boots' surfaces were collected. The wheels of wheelbarrows were washed and some samples were taken from adhesived materials of external wheels' surfaces. Dust samples were prepared by sweeping areas around the houses. Sampling from feed ingredients was done with collecting samples from feed maintaining sources. Stacked lime samples were collected with stirring and taking samples from liquid. Each sample was placed in screw capped container and then soaked overnight in distilled water (except stacked lime samples). Next day, each suspension was washed through a sieve with an aperture of ca. 0.15 mm into a beaker. The filtrates were placed in plastic centrifuge containers and centrifuged for 2 min. at 800×*g* and supernatants were discarded. This procedure was repeated 3 times. After these, sediments were floated in saturated solution of sodium chloride and prepared suspensions were centrifuged at 400×*g* for 10-15 min. and probable oocysts were removed from top surface of supernatants by using a pipette.

Present or absence of *Eimeria* oocysts in each treated sample were confirmed by microscopically examination with using the McMaster counting chambers.

Results and Discussion

Based on the presence of *Eimeria* oocysts, the results indicated that dust around the houses, boots, wheelbarrows, litter, feed ingredients and workers' hands were contaminated respectively with *Eimeria* oocysts in 39 (65%), 31 (51.7%), 27 (45%), 23 (38.3%), 10 (17%) and 5 (8.3%) cases from 60 samples that collected from each mentioned items. There was no *Eimeria* oocysts in samples were taken from stacked limes that situated in front of the houses.

In spite of advances in chemotherapy, management, nutrition and genetics, Coccidiosis remains one of the most expensive and common diseases of poultry production industry. At the present study, differential counts of the species present in each dropping were not made because it is impossible to distinguish accurately all species of *Eimeria* based on morphology alone (Joyner and Long, 1974; Long and Joyner, 1984). Because of high resistance of oocysts against environmental factors and absence of natural intermediate hosts for *Eimeria* oocysts, careful attention of biosecurity principles, good quality and dryness of litter and surveillance of litter hygiene are very important for reducing occurrence of Coccidiosis (Opitz, 1996). Results of this study showed that dust around the houses and mechanical parameters, specially boots and wheelbarrows are the most routes of introduction of *Eimeria* oocysts into broiler chick's houses whereas stacked lime in front of the houses prevented the presence of oocysts. Addition of any concentration of stacked lime evaluate markedly increase pH (Stanush *et al.*, 2000) and dryness of litter that lead to decrease the litter oocyst populations. The best proportion of stacked lime in water that is usually used for poultry houses is 5 at 1000. Although Kenneth (1991) suggested earlier that weekly blending of stacked lime with litter could be effective against Coccidiosis by reducing the litter humidity, Results of this study indicate that in spite of sanitation and control of mechanical parameters, regarding to usage of stacked lime in front of the houses and adding it to the litter and areas around the houses with a careful proportion and washing the boots and wheelbarrows with stacked lime can be very useful.

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References

Barta, J.R., B.A. Coles, M.L. Schmitz, M.A. Fernando, A. Martin and H.D. Danforth, 1998. Analysis of intraspecific variation among five strains of *Eimeria maxima* from North America. Parasitol. Int., 28: 458-492.

Grief, G., B. Stephan and A. Haberkorn, 1996. Interspecific polymorphisms of *Eimeria* species due to resistance against anticoccidial drug. Parasitol. Res., 82: 706-714.

Joyner, L.P. and P.L. Long, 1974. The specific characters of *Eimeria*, with special references to the coccidian of the fowl. Avian Pathol., 3: 145-147.

Karim, M.J., S.C. Basak and J. Trees, 1996. Characterization and immunoprotective properties of a monoclonal antibody against the major oocyst wall protein of *Eimeria tenella*. Infect. Immun., 64: 1227-1232.

Kenneth, W.B., 1991. Managing coccidiosis especially in broiler's pullets. Misset-World Poult., 7: 9.

Lee, E.H., 1993. Live Coccidiosis vaccines and a field immune variant of *Eimeria maxima*: a case report. In: Barta, J.R., M.A. Fernando (Eds.), Guelph. Ontario, pp: 118-121.

Long, P.L. and L.P. Joyner, 1984. Problems in the identification of species of *Eimeria*. J. Protozool., 31: 535-541.

Long, P.L. and J.G. Rowell, 1975. Sampling broiler house litter for Coccidiosis oocysts. Br. Poult. Sci., 16: 583-592.

Nowzari, N., D. Dinparast, N. Rahbari, S. Yakchali, B. Kazemi and J.G. Moazeni, 2005. Inter and intra-specific genetic variation of avian Eimeria isolated from Iran by random amplified polymorphic DNA-polymerase chain reaction. Vet. Parasitol., 128: 59-64.

Opitz, H.M., 1996. Disinfection of poultry houses requires attention to details. Poult. Digest., 8: 26-31.

Razmi, G.R. and G.A. Kaleideri, 2000. Prevalence of subclinical Coccidiosis in broiler-chicken farms in the municipality of Mashhad, Khorasan, Iran. Prev. Vet. Med., 44: 247-253.

Ryley, J.F., 1973. Cytochemistry, physiology and biochemistry. In: D.M. Hammond and P.L. Long (Eds.), The Coccidia. University Park Press, Baltimore and Butterworth's, London, pp: 145-181.

Shirley, M.W., 1989. New methods for the identification of species and strains of *Eimeria*, Cocccidia and intestinal coccidiomorphs. In: Proceeding of the 5th International Coccidiosis Conference, Tours, France, 17-20 October.

Stanush, D.D., R. Beltran, D.J. Caldwell and B.M. Hargis, 2000. The effect of hydrated lime on *Salmonella enteritidis* survival in poultry litter. In: The Southern Conference on Avian Diseases, 41st annual meeting. January 17-18, 2000.

Thebo, P., A. Lunden, A. Uggla and P. Hooshmand-Rad, 1998. Identification of seven *Eimeria* species in Swedish domestic fowl. Avian Pathol., 127: 613-617.

Williams, R.B., 1999. A compartmentalized model for the estimation of the cost of coccidiosis to the world's chicken production industry. Int. J. Parasitol., 29: 1209-1229.