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EFFECT OF MANAGEMENT PRACTICES ON INCIDENCES OF COCCIDIOSIS AND PERFORMANCE OF BROILER CHICKENS

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SUMMARY

The study was carried out for a period of eight weeks to assess the effect of three management practices on incidences of coccidiosis and performance of broiler chickens. Treatment 1, a prophylactic dose of coccidiostat (Amprolium) was administered throughout the study period. Treatment 2, litter was changed weekly and treatment 3 the litter remained unchanged during the experimental period. Ninety-nine day old broiler chicks were randomly assigned to the three treatments, each with three replicates. Each replicate was housed in a metal pen of size 3 x 4 x 1 ft and broiler mash and water were offered *ad libitum*. Data on mortality, weight gain, faecal oocysts and gross intestinal lesion characteristics were recorded.

Mortality during the experimental period was 2.02%, but was not caused by Coccidiosis. Oocysts were found in all treatments, the numbers being highest and lowest in treatment 3 and 1, respectively. Significant differences in weight gain were observed during week 2 and 5, being highest for treatment 3 and lowest for treatment 1. However no significant differences were observed for the overall weight gain between the treatments. Intestinal lesions were more severe in birds in treatment 3 and least severe in treatment 1.

From the present findings it was clearly shown that the use of coccidiostat was the best control method of coccidiosis provided it is administered properly.

Keywords: Coccidiosis, management, performance, broilers

INTRODUCTION

Coccidiosis is a disease of small intestines and caecal pouches of chicken and other birds caused by coccidia. Coccidia are often present in intestines of birds 3-6 weeks old in most flocks. Intracellular multiplication of coccidia cause tissue damage which inhibits digestive enzymes and absorption of nutrients (Awadally and Salem, 1993). Blood loss resulting from haemorrhage may result into anaemia if infection is severe (Dakshinkau and Dharmadhikary, 1985). This results into impaired feed conversion and poor growth rate. Oocysts in litter or droppings are usually most numerous at 4-5 weeks of age and generally decline thereafter (McDougald and Reid, 1997).

Coccidiosis is a disease of almost universal importance in poultry production and may occur in any type of poultry management system. However it is more prevalent in the intensive systems of production whereby flocks are confined and kept in high stocking densities. These practices favour build up of potentially pathogenic populations. Economic impact of coccidiosis varies from lowered productivity, increased veterinary expenses and actual chicken losses due to culling and death. The disease causes an estimated annual loss of over 1 billion US dollars worldwide and in Tanzania coccidiosis account for about 31% of all poultry diseases (Minga and Nkini, 1986).

Due to the economic importance of the disease several methods have been used in controlling coccidiosis in particular in broiler farms. These include improved sanitation and hygiene, control by chemoprophylaxis and chemotherapy. Use of anticoccidial drugs in controlling coccidiosis has sometimes been observed to lead to the development of drug resistance, tissue residue, drug toxicity and increased costs of production (Fraser *et al.*, 1984). This has led into development of several alternative strategies to combat the disease, even though the use of anticoccidials still remains as the major control measure.

The major objective of the present study was therefore to evaluate the effect of some managerial practices on incidences of coccidiosis in broiler chickens reared under the intensive deep litter system.

MATERIALS AND METHODS

Description of the study area

The study was carried out at the Poultry Unit in the Department of Animal Science and Production located at Sokoine University of Agriculture farm, Morogoro, Tanzania. The University is situated at around 6° - 7° S, 37° - 8° E, and about 550 metres above sea level. The annual precipitation ranges between 600-1000 mm. Temperature ranges between 15°-35° C.

The experimental birds and management

Ninety-nine day-old broilers chicks from Interchick Company Limited (Dar-es-Salaam) were used and were brood together during the first four days. On the 5th day of age the chicks were randomly assigned to the 3 treatment groups of 33 birds/group. Each treatment had three replicates, each with 11 chicks. The replicates were housed in metal pens of size 3 x 4 x 1 ft in a deep litter system using rice hulls.

In treatment 1 chicks were given a chemoprophylactic dose of Amprolium in drinking water, throughout the study period as recommended by the manufacturer. In treatment 2 litter was changed weekly and replaced with a clean and dry litter material during the study period. In treatment 3 chicks were not given Amprolium treatment and the litter was not changed throughout the study period. The study lasted for 8 weeks.

Data collection

During the study period the following parameters were taken; weight gain, presence of oocysts, intestinal lesion characteristics and mortality.

Weight gain

Chicks were weighed on the 5th day before distributing them to the experimental treatments and thereafter-individual weights were taken weekly. Weighing was done using a portable electronic weighing scale (Tefal®, Jolly). This enabled determination of weekly weight gain between groups during experiment period.

Screening for presence of oocysts

This was done on the 4th and 5th week of age. A day before collection, polythene sheet was placed on the floor to collect the faeces. All faeces from each replicate were thoroughly mixed and subsequently a representative sample of 3g was taken for determination of oocysts using the standard flotation method. Presence of oocysts was observed with a light microscope at 40x magnification. Quantification was done by averaging the number of oocysts present in ten fields per slide.

Gastrointestinal tract lesion characteristics analysis

On the 7th week one bird from each replicate was randomly selected and slaughtered and the carcass was opened to reveal the internal organs. The entire intestine was removed, opened and serosal and mucosal surface observed visually for presence of gross lesions.

Statistical analysis

Data on weight gain was analysed by computer using the SAS General Linear Model (GLM) procedure (SAS, 1988).

RESULTS

Mortality and health status

Generally the birds in all treatments remained healthy throughout the experiment. One death occurred in 2 and another in treatment 3 due to yolk sac infection and *Escherichia coli* infection during the 2nd and 3rd of the study period.

Presence of oocysts

Faecal samples collected from all groups contained oocysts. Samples from group 3 had more oocysts than the other groups (Table 1)

Table 1. Oocysts observed per fields in each group.

Treatment	Oocysts per field	
	Week 4	Week 5
1 (Coccidiostat)	+	+
2 (Litter changing)	+	++
3 (Control)	++	+++

Key: + = 1-4 Oocysts per field ++ = 5-9 Oocysts per field +++ = 10-19 Oocysts per field

3.3 Weight gain

Weight gain between the groups was not significantly different. However LSMeans values were substantially different, highest gain was in group 1and lowest for group 2 (Figure 1). There was a significant difference between groups in weight gain at different weeks except for week 2 and 5 in which there was no significant difference (Figure 2).

3.4 Lesion characteristics analysis

The lesion characteristic analysis of all sacrificed birds showed a presence pathological gross lesions in the intestine (Table 2).

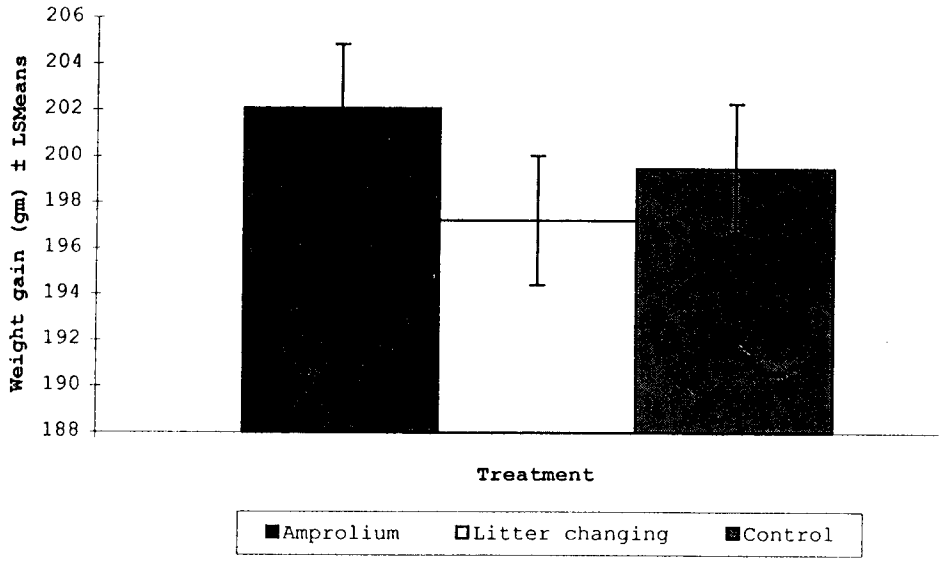

Figure 1: Weight gain (gm) ± LSMeans of different groups during study period.

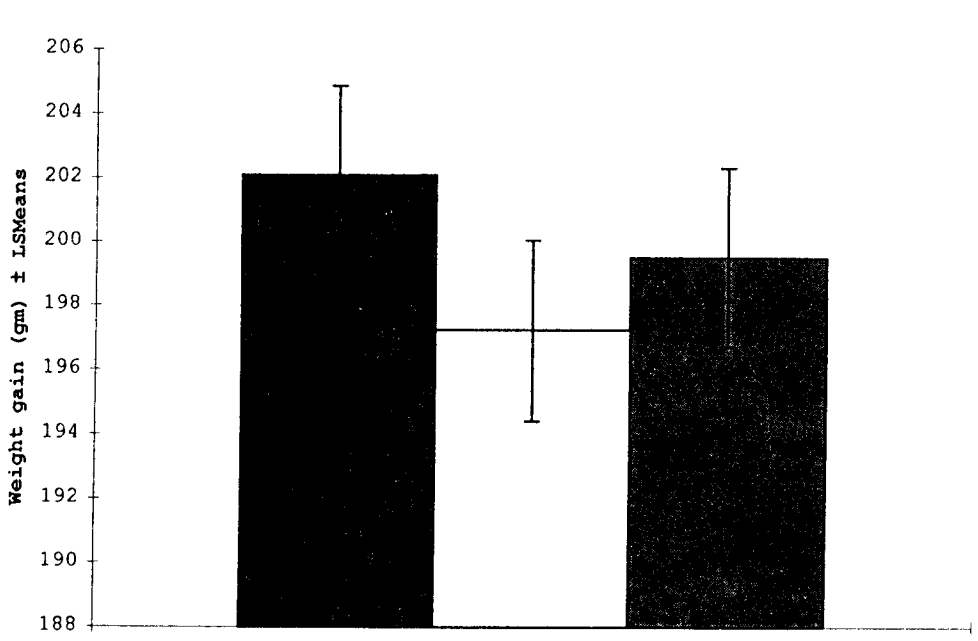

Figure 2: Weight gain(gm)± LSMeans of different groups in different weeks.

Table 2. Gross lesion characteristic in different parts of intestine

	Part of intestines			
Treatment	**Anterior**	**Central**	**Posterior**	**Caecum**
1	Slight desquamation Slight haemorrhage on serosa	Slight desquamation Slight haemorrhage	Smooth mucosa Slight haemorrhage at tip of rectum	Smooth mucosa
2	Desquamation Haemorrhage Thickened mucosa	Desquamation Haemorrhage Faeces mixed with blood Distended intestine	Haemorrhage Faeces mixed with Blood Thickened mucosa	Haemorrhage Faeces mixed with blood Thickened mucosa
3	Desquamation Haemorrhage Thickened mucosa Distended intestines	Haemorrhage Blood streaks Thickened mucosa Distended intestines	Faeces with blood Thickened mucosa	Haemorrhage Thickened mucosa

DISCUSSION

The results of the present study are discussed in relation to other findings. Insignificant differences in body weight between treatments observed in the present study are in agreement with findings reported by Douart *et al.* (1991). In their study they found out that using coccidiostats had an insignificant effect on body weight, feed consumption, feed efficiency and mortality. The significant difference in weight gain between weeks observed in the present study within the treatments was a result of a common phenomenon of growth (Needham, 1965)

The presence of oocysts in faecal samples from birds in all groups did not lead into development of clinical signs of coccidiosis. This indicates that the doses of infective sporocysts from the environment were not enough to cause clinical infection Reid (1990)
found that with less than 100 oocyst, chicken only produces subclinical infection that can only be detected by indirect laboratory studies. Infection of such few oocysts is normally due to oocysts that are normally omnipresent in the environment. These have a beneficial importance in building body protective immunity against subsequent attacks of coccidiosis. Farr (1943) and Harton-Smith (1963) found that graded oral doses of oocysts at weekly intervals induced sufficient immunity, which subsequently prevented any infection or oocyst production following challenge. This may be a reason as to why the control group did not develop clinical signs despite the fact that it did not get any coccidiosis control measure. Joyner and Norton (1976) pointed out the phenomenon of trickle infection, accounts for naturally acquired immunity present in many chicks that have never shown any sign of clinical coccidiosis. Reduced number of oocysts in the litter enhances this immunity, which continually reinforce any waning immunity initiated by early infections (Davis *et al.*, 1980).
Furthermore Soulsby (1982) found that presence of large number of oocysts may not necessarily indicate a serious pathological condition and in certain instances diarrhoea occurs before oocysts are shed in faeces. Weekly litter changing might have helped to keep the number of oocysts down and thus accumulation of oocyst in litter. Reid (1990) reported that coccidial infections are self-limiting in which Eimeria species usually stop reproducing if reinfection by new crop of sporulated oocyst is prevented.

The use of Amprolium in treatment 1 did not suppress completely oocyst production. These findings were in accordance with Reid (1990) who found that no drug has the ability of completely suppressing oocyst production. McDougald and Reid (1997) pointed out that finding of few oocysts by microscopic examination indicates a presence of infection but it is not a diagnosis of clinical coccidiosis. Hall (1985) further showed that presence of oocysts in faeces does not confirm presence of a disease, as large numbers of oocysts of one or more of Eimeria species may be present without causing clinical coccidiosis.

The gross lesions in the intestine had a positive correlation with the number of oocysts in each group i.e. the more the oocysts, the more the damage and vice versa. Morbidity and mortality of most species is usually proportional to the number of coccidial oocysts ingested (Zander, 1972). These findings are similar to McDougald and Reid (1997) who found that severity of lesions is generally proportionate to the number of oocysts ingested by the bird. However, the lesions were not severe to cause a clinical disease. Failure to show a clinical disease may also be attributed to age of birds. Reid (1972) found that subclinical coccidiosis is more common in growing poultry than clinical coccidiosis and it is characterized by presence of a few lesions or a few oocysts.

CONCLUSION AND RECOMMENDATIONS

The findings in the present study showed that administration of coccidiostat or weekly litter changing could prevent incidences of clinical coccidiosis and hence enhance good performance in terms of weight gain. However frequent litter replacement is costly in terms of litter material, labour and stress to the birds. It also interferes with body immunity against coccidiosis thus increasing susceptibility to the disease in case of outbreaks. This makes the use of coccidiostats be reliable and effective control method provided proper medication with a proper dosage is used.

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