Comparative efficacy of herbal and allopathy drugs against coccidiosis in poultry

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Abstract

For this study, 240 one-day-old broiler chickens were used to test the anti-coccidial efficacy of a herbal drug Coxigon® compared with a chemical synthetic Diclazuril® against Coccidiosis in broilers. These birds were divided into six groups (A, B, C, D, E, F) of forty birds each. There were six treatments, non-infected non-medicated (A), infected non-medicated (B), infected and medicated with Coxigon® at 3 g/1 kg of feed (C), infected and medicated with Diclazuril® at 0.20 g/1 kg of feed (D), non-infected but treated with Coxigon® at 3 g/50 kg of feed (E), and non-infected but treated with Diclazuril® (F) at 0.20 g/1 kg of feed. Groups B, C, and D were given a challenge dose of coccidial oocysts at the age of 22 days. Weight gain, feed consumption, oocysts count in the faeces, clinical findings and mortality were recorded. The mean values of feed intake during the experimental period (0-6 weeks) were 3770.4, 3206.5, 3493.3, 3333.3, 3751.5 and 3764.1 g for each of the groups A, B, C, D, E, and F, respectively. The results revealed that the birds of group E had better (P<0.05) weight gain (g) as compared to other groups. Moreover, Coxigon® at 3 g/1 kg of feed (C) had excellent performance in terms of oocysts count (31700/g of faeces) and lower mortality as compared with Diclazuril® (D).

Introduction

Coccidiosis causes considerable economic loss to the production of broiler chickens as reported by the Government of Alberta, Canada (2001). Chickens are susceptible to at least 11 species of coccidia. The most common species is Eimeria tenella, which causes caecal coccidiosis. Young chickens pick up the infection from contaminated premises (soil, houses, utensils, etc.). These may have been contaminated due to intensive rearing of great numbers of chickens in enormous houses; it creates conditions that are favorable to rapid proliferation of parasites with short, direct life cycles (McDougald, 1982). Oocysts remain viable in litter for several months and in this way they can contaminate a whole farm, year by year.

Coccidiosis has increasingly become a problem, as systems have become more intensive and as the slaughter age has declined. Birds easily develop natural immunity to coccidia; however at 42 days, the age at which broilers are now generally slaughtered, their immune systems are still not fully developed. To acquire natural immunity to coccidian, young birds ideally need to come into contact with low levels of several strains of the parasite (Williams et al., 1999).

Feed manufacturers are using synthetic feed additive anticoccidials to fight coccidiosis. The only constraints in their application are their relatively short shelf life and the high cost. Even prolonged use of synthetic anticoccidials often develops resistant in birds to these drugs (Hayat et al., 1996).

It seems imperative that alternative economical means and ways be explored to avoid the use of expensive coccidiostats. The present study was therefore planned to investigate the prophylactic effect of herb (Coxigon® containing active ingredients: Berberis aristata, Holarrhena antidysenterica, Momordica dioica, Melia azedarah, Melia azadirachta) in comparison with synthetic chemical (Diclazuril® containing active ingredient Diclazuril 0.5%) against coccidiosis in broilers.

Materials and methods

Collection of infected material

Coccidiosis suspected guts were collected from different poultry diagnostic laboratories. These collected intestinal contents and mucosal scraping from different tracts were subjected to microscopic examination (using low and high magnification) to identify the positive cases.

Identification of eimeria

Identification of various species of Eimeria was made on the basis of morphology as described by (Thienpont et al., 1979).

Isolation and sporulation of oocysts

The intestine and caeca contents from positive were homogeneously mixed and suspended in 2% potassium dichromate solution overnight for maceration. The suspension was filtered through a clean muslin cloth and allowed to sediment for 2 h. The sediment material was then mixed with saturated sodium chloride solution and the suspension was centrifuged at 1500 M for 2 min in graduated tubes. The top layer from each tube obtained was immediately pipetted out in a beaker and mixed with 1 L of water in order to dilute sodium chloride solution. The suspension was allowed to settle down and supernatant fluid was discarded. The sediment containing the oocysts was again suspended in 2% potassium dichromate solution to prevent the development of harmful bacteria. The suspension was kept overnight in ventilated Petri dishes and air currents were provided to each plate for sporulation of oocysts (Ministry of Agriculture, Fisheries and Food, 1986).

Counting of oocysts

The count of oocysts per mL of saturated dilution technique was performed. An aliquot of 1 mL was diluted in a test tube containing 9 mL of normal saline solution. The total numbers of oocysts were calculated by McMaster oocyst counting technique using 0.1 mL of normal saline solution (Thienpont et al., 1979).

Biological trial

Two hundred and forty day-old broiler chickens were randomly divided into six groups of 40 each and each group was further split into 4 independent replicates of ten chicken each, equipped with a free accessed feeder and
waterer having 5-10 cm bedding of new rice husk. Well-cleaned, hygienic and controlled environmental conditions were maintained in experimental shed. An isocaloric and isoproteinaceous experimental feed (Table 1) was prepared and divided in six equal portions (A to F). One portion left non-infected and non-medicated (A); second portion was lacking in any addition of coccidostat (B); third portion was medicated with Coxigon® as 300 g/100 kg of feed (C); forth portion was medicated with Diclazuril® at 20 g/100 kg of feed (D); fifth portion was non-infected but treated with Coxigon® at 300 g/100 kg of feed (E); and the sixth was non-infected but treated with Diclazuril® at 20 g/100 kg of feed (F). The birds of groups B, C, D were fed on 30,000 sporulated oocysts of mixed Eimeria species on day 22 (Table 2). All the birds and pens were closely observed before and after infection. The experimental feeds were randomly allotted to birds of 6 experimental groups; period of experiment was 42 days. Feed intake and body weight of birds were weekly recorded and clinical signs after infection were observed. The faecal samples were collected on day 27, 28 and 29 after infection to count oocysts/gram of faeces. Mortality was recorded and birds were necropsied to investigate the cause of death. The data obtained were analyzed statistically by analysis of variance and means was separated by least significant difference test (Steel et al., 1997).

**Results and discussion**

**Prevalence of coccidiosis**

Out of two hundred forty birds, 200 birds were given infection of Eimeria tenella and were selected for therapeutic trial.

**Growth parameters**

The maximum feed intake was recorded by the birds of group A and was significantly different (P<0.05) from feed intake of birds of groups B, C and D; however, feed intake of this group was non-significant compared with feed intake of birds of group A and was significantly different (P<0.05) from feed intake of birds of group E and F. The poorest FCR was observed in birds of infected group B (infected and non-medicated). These results are supported by Voeten et al. (1988), who found that coccidiosis adversely affected growth and feed conversion.

**Clinical signs and oocyst count**

The birds of infected groups B, C and D showed signs of appetite loss, dropping of wings, and pale, brown watery faeces with blood stains on day 5 post inoculation of infection. However, clinical signs were less pronounced in group C, while were more evident in groups B and D.

Faecal sample from each pen were collected on day 27, 28, and 29. No oocyst was observed in control group A, E and F. The highest (P>0.05) oocyst count (87,550) was found in group B (infected but non-medicated), whereas lowest count and less clinical signs like dull,

### Table 1. Chemical composition of experimental rations.

| Nutrients          | Broiler starter | Broiler finisher |
|--------------------|-----------------|------------------|
| Crude Protein, %   | 20.00           | 19.00            |
| Metabolizable energy, kcal/kg | 2850 | 2950 |
| Crude fibre, %     | 3.71            | 3.42             |
| Ether extract, %   | 3.58            | 3.63             |
| Ca, %              | 1.00            | 0.90             |
| Available phosphorus, % | 0.42 | 0.42 |
| Lysine, %          | 1.10            | 1.00             |
| Methionine, %      | 0.48            | 0.48             |
| Linoleic acid, %   | 1.50            | 1.50             |

### Table 2. Treatment plan of the experiment.

| Group | Diclazuril®, g/ton | Coxigon®, g/ton | Coccio oocyst/bird |
|-------|-------------------|-----------------|--------------------|
| A     | 0                 | 0               | 0                  |
| B     | 0                 | 0               | 30,000             |
| C     | 3,000             | 0               | 30,000             |
| D     | 0                 | 3,000           | 30,000             |
| E     | 0                 | 0               | 0                  |
| F     | 200               | 0               | 0                  |

### Table 3. Broiler production performance (0-6 weeks).

| Groups                              | Treatments                              | Feed intake/bird, g | Weight gain/bird, g | Feed conversion rate | Mortality rate, % | Total oocyst count |
|-------------------------------------|-----------------------------------------|---------------------|---------------------|----------------------|-------------------|--------------------|
| A                                   | Non infected + non-medicated control    | 3770.4             | 1671.4             | 2.25                 | 0                 | 0                  |
| B                                   | Infected + non-medicated control        | 3206.5             | 1313.9             | 2.41                 | 15                | 87,550             |
| C                                   | Infected + Coxigon®                    | 3493.8             | 1650.2             | 2.11                 | 2.5               | 31,700             |
| D                                   | Infected + Diclazuril®                  | 3333.3             | 1452.9             | 2.29                 | 10                | 53,800             |
| E                                   | Non-infected + Coxigon®                | 3751.5             | 1966.2             | 1.90                 | 0                 | 0                  |
| F                                   | Non-infected + Diclazuril®              | 3764.1             | 1680.0             | 2.23                 | 0                 | 0                  |

*a,b,c,dMeans with different superscripts are significantly different (P<0.05).*

### Table 4. Oocysts count in different experimental feeds at day 27, 28, and 29.

| Oocysts/g faeces | Non-infected Non-medicated | Infected Diclazuril® | Infected Coxigon® | Infected Diclazuril® | Non-infected Coxigon® | Non-infected Diclazuril® |
|------------------|-----------------------------|---------------------|------------------|---------------------|-----------------------|-------------------------|
| Counting days    | 27                          | 0                   | 31,500           | 15,150              | 21,550                | 0                       |
|                  | 28                          | 0                   | 29,450           | 11,450              | 17,700                | 0                       |
|                  | 29                          | 0                   | 26,600           | 5100                | 14,550                | 0                       |
| Total            | 0                           | 87,550              | 31,700           | 53,800              | 0                     | 0                       |

*Means with different superscripts are significantly different (P<0.05).*
depressed, profuse, incoercible diarrhoea and later bloody diarrhoea and anaemia were observed in group C (infected and medicated with Coxigon®) having 31,700 oocysts. The group D (infected and treated with Diclazuril®) showed 53,800 oocysts. The oocysts counts were lower in herbal treated group (Table 4). Likewise, Allen et al. (1998) reported that the herb *Artemesia annua* reduces oocysts yield. The results are also in line with Misra et al. (1993), who reported that Zycos (herbal anticoccidial) is effective to reduce faecal oocysts output. Large numbers of oocysts were produced in all the infected groups; however, the counts of Coxigon® treated group appeared to be significantly lower than in the remaining groups. Both drugs failed to give a parasite clear. Flock given anticoccidial drugs in feed remain susceptible to infection and clinical disease can readily occur at any time (Chapman, 1992).

Mortality due to coccidiosis was observed in groups B, C and D and was 15%, 2.5%, 10%, respectively. The highest mortality rate was recorded in group B, which is agreement with the results of Tipu et al. (2002), who reported highest mortality in birds that were infected but not medicated. Furthermore, the data revealed that mortality was at the lowest rate in group C (infected and Coxigon® treated). Similar to our results, Guha et al. (1991) reported reduced mortality rate with the use of herbal anticoccidial drugs.

**Postmortem findings**

Postmortem of dead birds was performed during the experimental period. The petechial hemorrhages were found in liver, spleen with hepatomegaly and splenomegaly. The hemorrhages were also observed on pericardium. Severe enteritis and haemorrhagic lesions were observed in upper, middle and lower portion of small intestine and caeca were swollen and filled with blood, indicating the involvement of *Eimeria tenella* as the major cause in birds' mortality. Similar findings were reported by Karim and Trees (1990), who identified infectious oocysts in the lesions seen at post-mortem. The results are also in agreement with Mandal et al. (1992) and Youn and Noh (2001), who concluded that herbal anticoccidials are safe and has no side effects and tissue destruction. No toxicity and poisoning were observed even at higher doses as in chemical drugs and no resistance is developed towards any species of Eimeria.

**Conclusions**

Coccidiosis is very prevalent in broiler chickens. Therapeutic trial was carried out by using Coxigon® and Diclazuril®. On the basis of the study results it was concluded that Coxigon® showed better results in term of weight gain, feed consumption, reduced oocyst count, as compared with Diclazuril®.

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