

Anticoccidial Effect of Combined Ethnobotanicals Against *Eimeria* spp. of Darag Native Chicken (*Gallus gallus domesticus* L)

**¹Maryneth B. Barrios, ¹Bede P. Ozaraga, ²Ma. Sylvia I. Ozaraga,
and ¹Leah A. Ingalla,**

¹College of Veterinary Medicine, ²College of Agriculture
Capiz State University - Dumarao Satellite College, Dumarao, Capiz, Philippines

Abstract

Coccidiosis is a serious disease in poultry industry that causes bloody diarrhea and mortality if taken for granted. Thus, this study was conducted to evaluate a potential ethnobotanicals to be used as alternative to control coccidiosis in poultry specifically native chicken. The study utilized combined ethnobotanicals as treatments: combined Artemisia and Oregano, Artemisia and Garlic, and Oregano and Garlic combination at a dose of 1.5 g/kg bodyweight of chicken. A total of 75 heads of Darag native chicken were used in the study. The study was conducted at the Darag Research Project of CapSU Dumarao funded by LRDC. The study revealed that all ethnobotanicals combination were found effective against coccidia of Darag native chicken and has similar effects with the commercial coccidiostat.

Keywords: anticoccidial, Darag native chicken, ethnobotanicals, *Eimeria* spp

Corresponding author: Maryneth B. Barrios
Address: Capiz State University - Dumarao Satellite College, Dumarao, Capiz, Philippines
E-mail: neth0285@yahoo.com

Introduction

The Philippine native chicken is an important livestock resource. It is the common fowl found in the backyards of most rural households. It is a mixture of different breeds and believed to have descended from the domesticated red jungle fowl. Aside from being good source of high quality protein, it provides additional livelihood to about 2.5 million Filipinos (PCARRD, 2007).

Many strains of native chicken are found in different areas of the country and have their distinct characteristics. One of these strains is Darag native chicken. Darag are the indigenous strains which are located only in Western Visayas. They are now in demand and gained its popularity because of many restaurants that specializes native chicken dishes like tinuom, binakol and inasal (WESVARDEC, 2009).

Native chickens are well known for their adaptability to local agro climatic conditions, hardiness, ability to utilize farm by products, tasty meat and resistance to diseases. However, because of the unpredictable changes in the environment due to climate change, they are also susceptible to a certain disease. One of these diseases is coccidiosis.

Avian coccidiosis is one of the most economically important diseases of the poultry industry caused by intestinal infection with several species of *Eimeria*, with *Eimeria tenella* being the most pathogenic species (Draganet et al., 2010). It is considered to be one of the most economically devastating parasitic diseases that currently plague the industry as it is responsible for high mortality and morbidity rates as well as poor feed conversion of birds that survive outbreaks (Allen and Danforth, 2002). Poultry operations all over the world are under threat of the disease and its prevalence results in the loss of millions of birds, accounting for more than 800 million US dollars in lost revenue annually all over the world (Chapman, 2002).

Drugs and live vaccines are the control measures used recently in the poultry farms (Abbas, 2012). But development of drug resistance in strains in the field and the withdrawal period for these drugs prior to slaughter necessitate the exploration of alternative methods for controlling coccidiosis (Chandrakesan et al., 2009).

Lately, various types of natural dietary additives based on botanical elements have been explored as sustainable alternatives of controls for coccidiosis and seen to be quite efficacious. Amongst the plant materials that have been tested and found to be effective for possible use as prophylactic feed additives are *Artemisia annua* L. commonly known as "artemesa"; *Oreganum vulgare* L. or "oregano" and *Allium sativa* L. or "garlic". Study of Barrios et al. (2016) showed that 1.5 grams of Oregano, Artemesa and Garlic per kilogram body weight of Darag native chicken shows an effective reduction of the coccidian oocyst per gram count of feces.

Hence, this study was conducted to evaluate the potential effects of the combination of these ethnobotanicals against coccidiosis of Darag native chickens.

The general objective of the study is to evaluate the efficacy of combined ethnobotanicals against coccidia (*Eimeria* spp) of Darag native (*Gallus gallus domesticus*). Specifically, it aimed to evaluate the efficacy of combined powdered ethnobotanicals in the percent reduction of the coccidian oocyst per gram (OPG) count of feces; determine which combination of powdered ethnobotanicals is the most effective in controlling coccidian spp. of Darag native chicken, and compare the efficacy of combined powdered ethnobotanicals and commercial coccidiostats in the percent reduction of coccidian OPG count.

Materials and Methods

Materials

The materials used in the study include the following: Seventy five (75) heads of naturally infested Darag native chickens of both sexes, with ages ranging from 2 months to 4 months old; poultry house with rearing pens, powdered ethnobotanicals (*Artemesia annua* L., *Oreganum vulgare* L. and *Allium sativa* L.) weighing scale, feeders, waterers, old newspapers, electric microscope, Mc Master, fecal cups, beaker, strainer, stirring rod, test tubes, test tube racks, slides, cover slips, sugar solutions, plastic bags, commercial coccidiostats, camera, labeling materials and record book.

Methods

Experimental Treatments

The study was composed of the following treatments: Treatment A – Control (No coccidiostats), Treatment B – 1.5 g/ kg BW of combined *Artemesia* and *Oregano* powder, Treatment C – 1.5 g/kg BW of combined *Artemesia* and *Garlic* powder, Treatment D – 1.5 g/kg BW of combined *Oregano* and *Garlic* powder and Treatment E – Commercial Coccidiostat. The Ethnobotanicals was mixed in 50:50 ratio.

Experimental Lay-out and Design

Completely Randomized Design (CRD) was used in the study. A total of 75 naturally infested experimental birds were randomly distributed to five treatments, each replicated three times. Randomization was done using the draw-lots scheme.

Administration of Powdered Ethnobotanicals

Powdered combined ethnobotanicals were weighed based on the amount/ dosage required and mixed to the feeds (mash form). This was administered to the birds daily for 5 consecutive days. Administrations of ethnobotanicals was done in the morning and given at dosage of 1.5 grams per kilogram body weight of experimental birds.

Data Gathering

Efficacy of Ethnobotanicals

The efficacy of ethnobotanicals were evaluated based on the reduction of oocyst per gram count of *Coccidia* spp. which were estimated by establishing oocyst per gram (OPG) count before and after administration of the powder ethnobotanicals.

Oocyst per Gram (OPG) Count

The data collected were the oocyst of the different species of *Coccidia* from the experimental birds. Pre - treatment oocyst per gram (OPG) count were gathered for three consecutive days before the administration of ethnobotanicals. Post - treatment oocyst per gram count were done on 7th, 14th, 21st and 28th day after administration of ethnobotanicals.

Statistical Tools and Analysis

The data gathered were recorded, tabulated and analyzed according to the needs of the study. Percent reduction of coccidian oocyst were obtained using the formula:

Percent Reduction

Where:

A = Pre-treatment oocyst per gram count

B = Post-treatment oocyst per gram count

Data collected were analyzed using the Analysis of Variance (ANOVA). Differences in treatment means were compared using the Least Significant Difference (LSD). The result was interpreted at five percent and one percent levels of significance.

Results and Discussions

Efficacy of Combined Ethnobotanicals against *Coccidia* (*Eimeria* spp.) of Darag Native Chicken

Figure 1 presents the percent reduction of the *Eimeria* spp. oocyst per gram count from 7th, 14th, 21st and 28th days post treatment.

Week 1 (Day 7) of the study revealed that all combined ethnobotanicals were found effective in the control of *Eimeria* spp. in Darag native chicken. Commercial coccidiostat (T5) obtained the highest percent reduction of 80.61%, followed by combined Artemisia and Oregano powder (T2) and Artemisia and Garlic (T3) with a mean of 75.11% and 60.9%, respectively. Lowest percent reduction was observed to Oregano and Garlic (T4) with a mean of 47.02%. No reduction was observed in the

control group (T1). Analysis of variance revealed that there was no significant difference ($p > 0.01$) in the percent reduction of the oocyst per gram count of chicken treated with combined ethnobotanicals and commercial coccidiostat.

Week 2 (Day 14) of the study revealed that all combined ethnobotanicals were found effective in the control of *Eimeria* spp. in Darag native chicken. Artemisia and Oregano (T2) had the highest percent reduction of 87.57%, followed by combined Artemisia and Garlic (T3) and commercial coccidiostat (T5) with a mean of 71.19% and 63.28%, respectively. Lowest percent reduction was observed to Oregano and Garlic (T4) with a mean of 60.35%. No reduction was observed in the control group (T1). Analysis of variance revealed that there was no significant difference ($p > 0.01$) in the percent reduction of the oocyst per gram count of chicken treated with combined ethnobotanicals and commercial coccidiostat.

Week 3 (Day 21) of the study revealed that all treatments except control group has significantly the same ($p > 0.01$) effect in the reduction or control of the *Eimeria* spp. oocyst where commercial coccidiostat obtained numerically the highest percent reduction of 91.50%, followed by combined Artemisia and Oregano (81.54%), combined Oregano and Garlic (78.39%) and combined Artemisia and Garlic (67.22%). No reduction in the control group.

Week 4 (Day 28) of the study showed that Treatments 2, 4 and 5 are significantly the same ($p > 0.01$) effect in the reduction of the coccidian parasite in Darag native chicken but significantly different from Treatment 3 and 1. Data further showed that in numerical number, combined Artemisia and Oregano powder obtained the highest reduction with a mean of 88.47%, followed by commercial coccidiostat (88.44%), combined Oregano and Garlic (66.26%) and combined Artemisia and Garlic (50.21%).

The result conforms to the study of Draganet.al (2010) that proved the anti coccidiostat property of Artemisia which can significantly reduce the fecal oocyst of 90.76% for the birds treated with 1.5% of powder in their feeds. The study of Arczewska and Swiatkiewics (2012) proved the anticoccidial property also of Oregano and Garlic. He found out that birds given with 1g/kg body weight partly lessen the negative impact of *Eimeria* infections in broiler chickens. Barrios et al., (2016) also proves that 1.5 grams of powdered Artemisia, Oregano and Garlic are found effective in the control of the fecal oocyst count of Darag native chicken. This alleviation of oocytes count by Artemisia, garlic and oregano was due to some active components of these herbal plants like artemisinin (Artemisia), allicin (Garlic) and flavonoids (Oregano).

Artemisinin alters the process of oocyst wall formation resulting in an incomplete oocyst wall (organized two opposite poles), with the death of developing oocysts and reduction in the sporulation rate. Artemisia also has an inhibitory effect directly on the oocyst sporulation and damaging effect of sporulated oocyst (Del Cacho et al., 2010). Allicin acts on inhibition of enzyme systems, DNA, RNA and

protein synthesis of *Eimeria*. Flavonoids causes' damage of cell membrane, leading to the inhibition of the macromolecular synthesis.

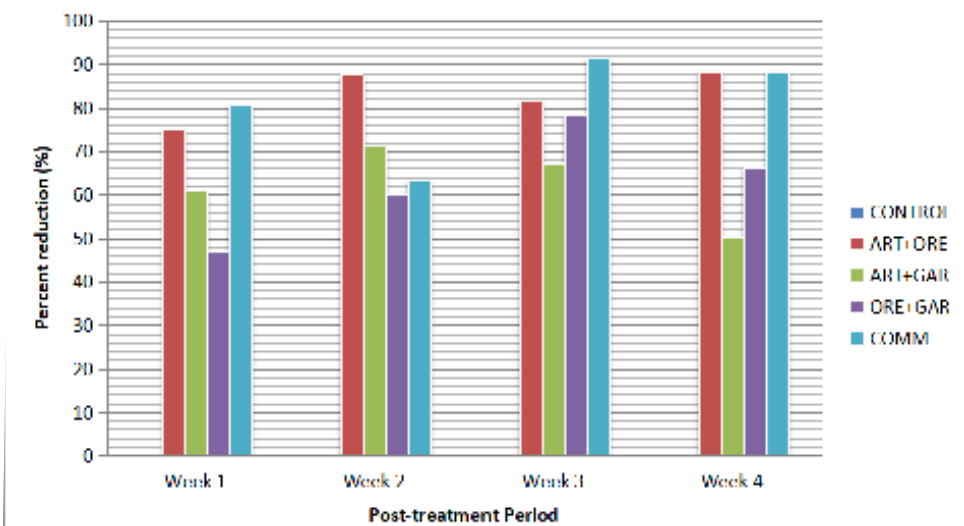


Figure 1. Percent reduction of oocyst per gram (OPG) count treated with different combined ethnobotanicals at 7th, 14th, 21st and 28th day post treatment in Darag native chicken.

Average Pre Treatment and Post Treatment Count *Eimeria* spp. as Affected by Different Treatments

Table 2 presents the average pre treatment and post treatment fecal count of *Eimeria* spp in four weeks of the study. Data showed that before administration of the different treatments, fecal count of *Eimeria* spp. oocyst ranged from 10.67 to 226.67. However, after administration of the combined ethnobotanicals and the commercial coccidiostat, the fecal counts change. A consistent reduction of the fecal count was observed from Week 1 (Day 7) to Week 4 (Day 28) of the study. The average fecal counts ranges from 18 – 64.11 (Week 1), 7.83 – 16.83 (Week 2), 9.67 – 23 (Week 3) and 6 – 37 (Week 4). On the other hand, the untreated or the control group recorded an increase in the OPG count ranging from 10.67 to 102 from Week 1 to Week 4 of the study and much higher than in the pre treatment OPG count.

Table 1. Average Pre Treatment and Post Treatment Count *Eimeria* spp. as Affected by Different Treatments

Treatment	Pre Treatment	Post Treatment Period			
		W1	W2	W3	W4
T1- Control	10.67	19.00	22.67	80.00	102.00
T2- Artemisia + Oregano	226.67	51.36	15.00	23.00	9.67
T3- Artemisia + Garlic	112.67	18.00	16.67	9.67	6.00
T4- Oregano + Garlic	113.67	64.11	16.83	7.33	37.00
T5- Commercial	214.56	35.22	7.83	15.67	26.00

Conclusions

Based on the findings of the study, the researchers concludes that combined Artemisia + Oregano, Artemisia + Garlic and Oregano + Garlic are found effective in the reduction of the oocyst per gram count of coccidia (*Eimeria* spp.) of Darag native chicken. Further, the combined ethnobotanicals has similar effect to commercial coccidiostat.

Recommendations

The researchers recommend the use of combined Artemisia + Oregano, Artemisia + Garlic and Oregano + Garlic at 1.5 g/kg BW of Darag native chicken as control for the coccidia (*Eimeria* spp.). Further studies related to this in other preparation and dosage to other species should be conducted.

Acknowledgment

The researchers express their gratitude and thanks to Livestock Research Development Center, Research Development and Extension of Capiz State University for funding the research study.

References

- ABBAS, R. Z., D. COLWELL AND GILLEARD, J. 2012. Botanicals an Alternative Approach for the Control of Avian Coccidiosis. *Worlds Poultry Science Journal*. 68 203 – 215.
- ALLEN, P. C. AND DANFORTH, H. D. 2002. Effects of Dietary Supplementation with n-3 fatty acid ethyl esters on coccidiosis in chickens. *Poultry Science*, 77:1631 – 1635.
- ARCZEWSKA, A. AND SWIATKIEWICZ, S. 2012. The Effect of a Dietary Herbal Extract Blend on the Performance of Broilers Challenged with *Eimeria* oocysts. *J. Anim. Feed Sci.* 21

- BARRIOS, M., B. OZARAGA and M. OZARAGA. 2016. Efficacy of Ethnobotanicals against Coccidiosis (*Eimeria* spp.) in the Productive Performance of Darag Native Chicken (*Gallus gallus domesticus* L.). Un Published Master Thesis Book. Capiz State University, Buriyas Campus, Mambusao, Capiz
- CHANDRAKESAN, P., K. MURALIDHARAN, V. D. KUMAR, T. J. PONNUDURAL, K. S. HARIKRISHNAN AND RANI, V. N. 2009. Efficacy of Herbal complex Against Caecal Coccidiosis in Broiler Chickens. *Veterinary Archive*. Vol. 79. P. 199 – 203.
- CHAPMAN, D. 2002. Sustainable Coccidiosis control in Poultry Production: The role of live vaccines. *International Journal for Parasitology*. Vol. 32. 617 – 629.
- DRAGAN, L., A. TITILINCU, I. DAN, I. DUNCA, M. DRAGAN AND MIRCEAN, V. 2010. Effects of Artemisia annua and Pimpinella anisum on *Eimeria tenella* (Phylum Apicomplexa) low infections in Chickens. *Science Parasitology*. Vol. 11. P. 77 – 82. ISSN 1582 – 1366.
- DEL CACHO, E., M. GALLEGO, J. QUILEZ AND ACEDO, C. 2010. Effect of Artemisinin on Oocyst wall Formation and Sporulation during *Eimeria tenella* Infection. *Parasitology International*. Doi. : 10 – 16.
- PCARRD. 2007. Profitability Analysis : 200 Hen Module of Native Chicken Production. 1st Edition. ISSN: 1908 – 8043. DOST, Los Baños, Laguna
- WESVARDEC. 2009. Information Bulletin no. 258 – 2009. The Darag Native Chicken. <http://www.thehealthcloud.co.uk/what-is-carvacrol/>. Retrieved February 2, 2018
- <http://iecdarag.blogspot.com>, Date Retrieved: February 2, 2018