Effect of Formulated Botanical Dewormer Against Roundworms of Philippine Native Cattle

Maryneth B. Barrios, Leah A. Ingalla, Bede P. Ozaraga
Capiz State University - Dumarao Satellite College

Abstract

This study aimed to evaluate the efficacy of formulated combined Ipil-ipil seeds (Leucaena leucocephala) and betel nut (Areca catechu) dewormer against roundworms of cattle. The study utilized 15 heads of naturally infested native cattle aged 1-year-old and above arranged in a Completely Randomized Design (CRD) with three replications. Experimental treatments include Treatment A – Control (No Dewormer), Treatment B – 20 g/20 kg BW of Formulated Ethnobotanical Dewormer, Treatment C – 40 g/20 kg BW of Formulated Ethnobotanical Dewormer, Treatment D – Commercial Dewormer. Data on the efficacy of ethnobotanicals were obtained by getting the percent reduction of the egg per gram (EPG) count before administering the treatments and on the 7th, 14th, 21st, and 28th day post-treatment. Analysis of variance (ANOVA) and Least Significant Differences (LSD) interpreted at 5% significance levels were used for statistical analysis. Results of the study showed that formulated ethnobotanical dewormer could significantly reduce the egg per gram count of roundworms of native cattle. Both the dosage of 20 g/ 20 kg BW and 40g/ 20kg BW of formulated botanical dewormer are effective in controlling cattle roundworms and have comparable effects to commercial dewormers.

Keywords: Betel Nut, EPG, Ipil-ipil seed, Native Cattle

Corresponding author: Maryneth B. Barrios
Address: Capiz State University - Dumarao
E-mail: mbbarrios@capsu.edu.ph

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Introduction

Livestock production constitutes a very imperative component of agricultural economy of developing countries, a contribution that goes beyond direct food production to include multipurpose. In most cattle-producing areas in the world, infection by helminth parasites (particularly gastrointestinal nematodes) is considered to be a prevalent and primary cause of production loss (Barger, 1993). In severe cases, parasitic diseases may even cause death. An infestation of parasites can cause cattle stress and diminish their conditioning and vigor, the appearance of diseases like anemia, lower feed intake, and conversion, lower average daily gains or milk production, and reduced reproductive performance (Akhtar et al., 2000).

Control of these parasitic nematodes in livestock animal is now becoming a serious constraint, particularly in the large ruminant industries, although cattle producers have the best intentions when it comes to treating their animals for intestinal parasites, routine and frequent anthelmintic treatment is likely contributing to resistance (Herath et al., 2021), leading to a resurgence of interest in the use of herbal medicines to control and treat diseases and parasites in ruminant animals. There is also a general belief that natural products are safer and more harmonious with biological systems (Erasto, 2005).

Plants that are known to have anthelmintic properties are betel nut (Areca catechu) and Ipil-ipil (Leucaena leucocephala). Betel nut belongs to the family Arecaceae, in which the seeds are used as an anthelmintic that contains alkaloids, arecoline, and tannins. Arecoline is toxic to some worms and can paralyze them. Proanthocyanidins (a group of condensed tannins) can inhibit enzymes and degrade membranes. The inhibition of enzymes causes metabolic failure, which decreases energy production and leads to worm death. Tannins also act as anthelmintic through their ovicidal properties. Ipil-ipil seed, on the other hand, showed the most active fraction to contain mimosine, a well-known toxic amino acid that is found in the seeds. Ademola et al. (2005) proved the anthelmintic effects of the protein extracts of L.leucocephala, which had a detrimental effect on nematode eggs.

Several researches were also conducted on the efficacy of botanical dewormers in controlling gastrointestinal parasites, particularly in native chickens. Therefore, the purpose of this study is to evaluate its potential as an anthelmintic against gastrointestinal parasites of cattle, hence this study. Generally, this study was conducted to evaluate the effect of formulated ethnobotanical dewormer against roundworms of cattle. Specifically, this study was conducted to evaluates the efficacy of formulated botanical dewormer in the percent reduction of the egg per gram (EPG) count of feces, determine which dosage of ethnobotanical dewormer is most effective in the reduction of roundworm eggs and compare the efficacy of formulated ethnobotanical dewormer and commercial dewormer in the percent reduction of round worms egg count.

Materials and Methods

Materials. Materials used in the study includes the following: twelve (12) of naturally infected cattle of both sexes with ages starting from 1 year and above; experimental house with rearing pens/paddocks, powdered ethnobotanical dewormer (Ipil-ipil and Betel nut), dextrose powder, weighing scale, feeders, waterers, old newspaper, electric microscope, Mc master, fecal cup, beaker, strainer, stirring rod, test tubes, test tube racks, slides, coverslips, sugar solutions, methylene blue, plastic bags, commercial dewormer, camera, labeling materials, and record book.

Experimental Treatments. The study composed of the following treatments: Treatment A – Control (No Dewormer), Treatment B – 20 g/20 kg BW of Formulated Ethnobotanical Dewormer, Treatment C – 40 g/20 kg BW of Formulated Ethnobotanical Dewormer, Treatment D – Commercial Dewormer.

Experimental Lay-out and Design. Completely Randomized Design (CRD) was used in the study. A total of 12 naturally infected experimental animals were randomly distributed to four treatments, each replicated three times. Randomization was done using the draw-lots scheme.

Administration of Powdered Ethnobotanicals. Powdered ethnobotanicals were weighed based on the dosage required and mixed to water to make a drenching bolus. Ethnobotanicals were administered by drenching method to the experimental animals and was repeated 14th day after the first administration. Administration of ethnobotanicals were done in the morning.

Data gathering

Efficacy of Formulated Ethobotanical Dewormer. The efficacy of formulated ethnobotanical dewormer was evaluated based on the reduction of egg per gram count of intestinal parasites which estimated by establishing egg per gram (EPG) count before and after administration of the powdered ethnobotanical dewormer.

Egg per Gram (EPG) Count. The data collected were the eggs/ova of the different species of intestinal parasites from the experimental animals. Pre-treatment egg per gram (EPG) count was gathered for three consecutive days before the administration of ethnobotanical dewormer. Post-treatment egg count was done on 7th, 4th, 21st and 28th after administration of ethnobotanical dewormer.

Statistical Tools and Analysis. The data gathered were recorded, tabulated and analyzed according to the needs of the study. Percent reduction of roundworms were obtained using the formula:

Where:

A = Pre-treatment egg per gram count

B = Post-treatment egg 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 results were interpreted at five percent levels of significance.

Results and Discussions

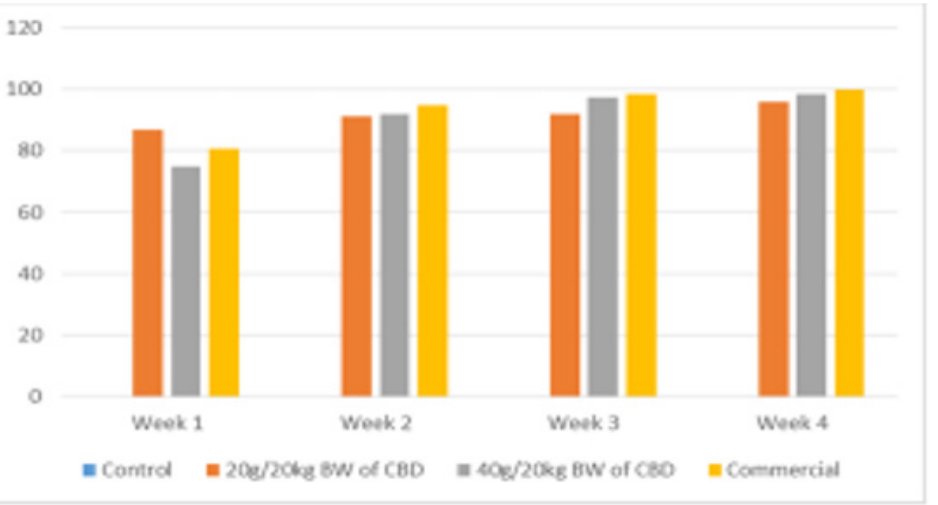

Figure 1 presents the percent reduction of the roundworms egg per gram count from 7th, 14th, 21st and 28th days post treatment.

Week 1 (7th day post treatment) of the study revealed that formulated ethnobotanical dewormer were found effective in the control of roundworms in native cattle. Treatment B - 20 grams/20kg BW of formulated ethnobotanical dewormer obtained the highest rate of reduction with the mean of 86.80%, followed by Treatment D - Commercial Dewormer and Treatment C - 40 grams/20kg BW of formulated ethnobotanical dewormer with a mean of 80.52% and 74.81%, respectively. No reduction was observed in the egg per gram count of cattle roundworms under Treatment A – Control, which did not receive any treatment. Analysis of Variance of the study revealed that all dosages (20g and 40g/ 20kg BW) of formulated etnobotanicals and commercial dewormer have comparable effects in the reduction of cattle roundworms eggs and was significantly different from the control group ($p > 0.01$).

Week 2 (14th day post treatment) 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 roundworms eggs where commercial dewormer (Treatment D) obtained numerically the highest percent reduction of 94.94%, followed by - 40 grams/20kg BW of Formulated Ethnobotanical Dewormer (Treatment C) with a mean of 91.92% and 20 grams/20kg BW of formulated ethnobotanical dewormer (Treatment B) with a mean of 91.08%. No reduction was observed in the control group.

Week 3 (21st day post treatment) of the study revealed that all dosages of formulated ethnobotanicals dewormer and commercial dewormer were found effective in the control of roundworms in native cattle. Treatment D - Commercial Dewormer obtained the highest rate of reduction with the mean of 98.43%, followed by Treatment C - 40 grams/20kg BW and Treatment B - 20 grams/20kg BW of formulated ethnobotanical dewormer with the mean of 97.45% and 91.94%, respectively. There was no reduction observed in the egg per gram count of cattle roundworms under Treatment A – Control. Analysis of Variance of the study revealed that all dosages (20g and 40g/ 20kg BW) of formulated etnobotanicals and commercial dewormer have comparable effects in the reduction of cattle roundworms eggs and was significantly different from the control group ($p > 0.01$).

Week 4 (28th day post treatment)) of the study revealed that Treatments B, C and D are significantly the same ($p > 0.01$) effect in the reduction of the egg per gram of native cattle roundworms but significantly different Treatment A (Control). Data further showed that in numerical number, commercial dewormer (Treatment D) obtained the highest reduction with a mean of 99.81%, followed Treatment C - 40 grams/20kg BW and Treatment B - 20 grams/20kg BW of Combined Botanical Dewormer with the mean of 98.49% and 95.91%, respectively. No reduction was observed in the control group (Treatment A). The result of the study conformed to Ozaraga and Ozaraga (2017) study which proved the efficacy of Ipil-ipil and Betel Nut in controlling gastrointestinal helminth of native chicken, which can significantly reduce the roundworm eggs of 95.91% and were comparable to the effect of commercial dewormer. The reduction of the parasites eggs after treated with the Ipil – ipil seeds and betel nut powder was due to its active chemical compound, mimosine glycine of the ipil-ipil which arrested the dividing cells therefore gradually killing the parasite. The betel nut on the other hand, contains arecoline which the mode of action is the inhibition of the gamma amino benzoic acid receptors thus causing paralysis of the parasite (Ozaraga et al., 2015).

Conclusions and Recommendations

Based on the findings of the study, the researchers concludes that formulated ethnobotanical dewormer can significantly reduce the egg per gram count of roundworms in cattle. The dosage of 20g/20kg and 40g/20kg per BW of formulated ethnobotanical dewormer are effective in the reduction of roundworm eggs. Further, formulated ethnobotanical dewormer has a comparable effect in the reduction of the cattle roundworms eggs. The researchers recommend the use of formulated ethnobotanical dewormer either in 20g or 40g/ 20 kg BW of cattle as alternative to commercial dewormer to control the roundworms infection and to prevent anthelmintic resistance. Further studies related to this in other preparation and dosage to other species should be conducted.

References

Ademola,D. A.I. Akanbi and S.O. Idowu. (2005). Comparative Nematocidal Activity of Chromatographic Fractions of Leucaena leucocephala. Seed Against Gastrointestinal Sheep Nematodes, Pharmaceutical Biology, 43:7, 599- 604, DOI: 10.1080/13880200500301761

Akhtar, Z.D. Sindhu, M.N. Khan and A. Jabbar. (2003). Review herbal dewormers in livestock-A traditional therapy. Int. J. Agric. Biol., 5: 199-206.

Bargerer, I. A. (1993).Control of gastrointestinal nematodes in Australia in the 21st century. Veterinary parasitology 46: 23-32.

Erasto, P. O. Adebola, D. S. Grierson and A. J. Afolayan. (2005). An ethnobotanical study of plants used for the treatment of diabetes in the Eastern Cape Province, South Africa.ARC-Vegetable and Ornamental Plant Institute, Private Bag X293, Pretoria 0001

Herath,MPD, Aya C. Taki, Brad E. Sleebs, Andreas Hofmann, Nghi Nguyen, Sarah Preston, Rohan A. Davis, Abdul Jabbar, Robin B. Gasser. (2021).Advances in the discovery and development of anthelmintics by harnessing natural product scaffolds.Advances in Parasitology.Academic Press.Volume 111.Pages 203-251

Ozaraga, B., Ozaraga M.S., and Barrios M. (2015). Botanical Dewormer for Native Chicken. Mindanao Journal of Science and Technology(.https://mjst.ustp.edu.ph/index.php/mjst/issue/view/9

Ozaraga, M.S and Ozaraga B. (2017). Efficacy of Ipil-ipil (Leucaena leucocephala), Betel nut (Areca catechu) and Papaya (Carica papaya) seeds against Roundworms of Darag native chicken. Philipp J Vet Anim Sci 2017 43 (1): 33- 37