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Comparative study of Albendazole and Papaya seed in the control of Gastrointestinal Nematodes in Goats

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Abstract

Twelve West African goats (Capra hircus) with gastrointestinal helminthes were used to determine the efficacies of Albendazole and pawpaw seeds (Carica papaya) solution in the treatment of gastro-intestinal nematodes. The animals were allotted into three groups of four animals each. Group 1 was administered 2 ml/10 kg body weight albendazole. Group 2 received 50 mg/10 kg body weight C. papaya seed solution twice a week and Group 3 was the control without treatment. The Modified McMaster counting technique for the fecal egg count was employed to determine the efficacy of the anthelmintic used. Albendazole achieved 100% efficacy while C. papaya seed solution had 74% efficiency on the 14th day post-treatment. The nematode species identified in the larval culture were (Strongyloides {60%} and Haemonchus contortus {40%}) in the goats.

Keywords: Albendazole, fecal egg count, gastrointestinal nematode, goat, papaya seed.

Introduction

Goats as small ruminants have some advantages over larger animals such as cattle because of their low purchase price; fecundity and prolificacy. They have ability to survive on low quality feeds, in difficult conditions and are more readily available. (Rene Coste, 1996). In some parts of the world, goat production is now becoming a profitable enterprise because of the high demand for dietary animal protein. Inspite of their advantages, goats are easily infested with parasites. The disease caused by parasitic gastrointestinal nematodes is of economic importance and a common problem in small ruminants (Beriajaya and Stevenson, 1985; Karki, 1987). The disease can limit growth rates and if severe, can lead to death (Beriajaya *et al.*, 1995). The effects of endoparasites on production are well documented (Joshi, 1998) and this include: unthriftness, reduced feed intake, anorexia, loss of blood, alterations on protein metabolism, depressed level of minerals and diarrhea. All these contribute to depressed weight gain (Soulsby, 1982). The effect of haemonchus infection recorded by Gray (1986) showed that the live weight gain of lambs and kids were reduced by 38% on the average, over a period of two months. Shrestha *et al.,* (1990) reported 60 percent higher weight gain in anthelmintic treated goats than the control.

In most developed and developing nations, anthelmintics are widely used for the control of nematodes infection in goats and other animals. Albendazole is one of the most commonly used dewormers for controlling gastro-intestinal nematode in livestock. The use of botanicals as anthelmintic by local farmers is a means of finding an alternative to the conventional drugs In addition, farmers should be aware of the most effective anthelmintic agents to which the endoparasites are not resistant to, so that farmers will not waste their money when buying dewormers that are not effective (Anaeto, 2001). This is important because there is a need for a cheaper and more easily available alternative form of anthelmintic compared to the more expensive conventional drugs (Chema and Ward, 1990). The commonly used indigenous plants as dewormers by farmers are ipil-ipil (*Leucaena leucocephala)*, pawpaw (*Carica papaya)* seeds, bitter gourd (*Momordica charantia*) leaves in coconut milk, mimosa plant parts (*Mimosa pudica*) and Panyawan *(Tinosphara rumphii)* (Cerbito, 1998). *C. papaya* fruits are used for fruit salad and desserts by humans and are considered to have a mild laxative effect, while its seeds are used medicinally for animals

against worms (Samson, 1986). The powdered form of *C. papaya* seeds, are used as vermifuge, the same with the latex. Papain the active constituent of the fruit is used effectively as an anthelmintic.

The objectives of the study were to compare the anthelminthic efficacies of Albendazole and *C. papaya* seeds against the gastrointestinal nematodes of goats and to identify the nematodes present in the goats kept on Babcock University Farm using larval culture.

Material and methods

This study was conducted at the goat unit, Babcock University, Ilishan-Remo, Ogun State, Nigeria. Twelve goats were used for the experiment. The 12 animals were divided into 3 groups and identified with plastic tags, after the pre-treatment fecal egg count.

Pre – treatment examination

Three days before dosing the animals with the anthelmintics, fresh fecal samples were collected from the rectum of each individual goat by hand using a plastic glove in other to determine the degree of parasitism and for grouping of the animals. The mean pre-treatment fecal egg count for Group 1 (Albendazole) was 800 eggs/gram, Group 2 *C. papaya* was 800 eggs/gram while the control, Group 3 was 900 eggs/gram.

Anthelmintic treatment of experimental animals

Each animal was dozed by mouth on day zero according to body weight as recommended by the manufacturers. The drug was administered orally using the barrel of syringe (Garbin and Gonzaga, 1999). Group 1 composed of 4 goats was treated with Albendazole at a dose of 2ml/10kg body weight. The *C. papaya* seeds obtained from ripe pawpaw fruits were dried and ground into powder. The ground seed was then mixed with water and was used as treatment for animals in Group 2 at a rate of 50mg/10kg body weight (eight seeds), twice a week. Group 3 served as the control and was left untreated.

Faecal examination using the McMaster method

Fresh fecal samples were collected individually from the rectum of the 12 animals. The fecal samples were placed in individual polyethylene bags, labeled, placed in an ice-box and taken to the Veterinary Parasitology Laboratory of the University of Ibadan for faecalysis using the McMaster Egg Counting technique. Three grams of feces was weighed for each sample. The samples were placed in individual jar and 5 ml of water was added and then left for 20 minutes so that the pellets can be softened. The pellets were then broken using a spatula. Saturated salt solution of 45ml was added to each of the 12 samples and thoroughly mixed. A Pasteur pipette with teat was used to withdraw the mixture which was quickly used to fill each chamber of a McMaster slide. The slide was then viewed under the microscope with magnification of 10. The total number of eggs counted, multiplied by 100, indicated the number of eggs per gram (EPG) of faeces (Thienpont, *et al.,* 1979; Hansen and Perry, 1994)

Fecal egg count reduction test

Feces were collected directly from the rectum of each goat on days 7 and 14 post treatment and processed for the fecal egg count using the modified McMaster Counting Technique. The fecal egg count reduction (FECR) test was used to evaluate the efficacy of the dewormers. Percentage efficacy was calculated using the formula:

$$\%FECR = 100(X_c - X_t)/X_c$$

Where Xt is the number of parasites or EPG in treated goats and $X_{c\ is}$ the number of parasites or EPG in the control goats. (Coynes *et al.*, 1991)

Identification of the species of nematode using the larval culture

Bulked fecal samples were cultured at room temperature for seven days to provide larvae for identification (Aken *et al.,* 1994). The fecal sample was mixed with a little amount of water in a jar and covered with paraffin paper. On day 7, the cover was removed and the jar was filled with water. A petridish was used to cover the jar. The jar was inverted and 20 – 40 ml of water was placed on the petridish. The setup was allowed to stand for one hour with one side slightly elevated and a pipette was used to draw the water from the petri dish into a test tube. Two drops of Clorox (Sodium hypochlorite 3.5%) and iodine was added into the test tube to kill the larvae and also to remove the sheath for easy identification of the larvae under the microscope. The morphological characteristics of the third stage larvae based on the description of (Soulsby 1982; Hansen and Perry, 1994) were used as guide to identify the larvae.

Results and Discussion

Results of the fecal egg count reduction test using Albendazole and *C. papaya* on days 7 and 14 post-treatment is presented in Table 1 and Figure 1.

The drop in the fecal egg per gram count in the group treated with Albendazole clearly indicates the anthelmintic effectiveness in goats. While *C. papaya* is slightly effective because it had 74% using the criteria for evaluating the degree of efficacy of an

anthelmintic, according to Manuel, (1983), and according to the recommendation of the World Association for the advancement of Veterinary Parasitology, antihelmintic resistance is present if the percentage of the reduction in egg count is less than 95% and the 95% confidence level is less than 90% (Coles *et al.,* 1992). These criteria were fulfilled by Albendazole which had an efficacy of 71% and 100% on days 7 and 14 respectively.

Table 1 Least Significant Difference (LSD) for the 7th and 14th day post-treatment

Groups	x EPG (d. 7)	x EPG (d. 14)
Gp. 1 -albendazole	300[a]	0[a]
Gp. 2 - *C. papaya*	400[a]	150[b]
Gp. 3 - Control	1000[b]	1500[c]

abc: Means followed by the same letters are not significant (P>0.05)

Fig 1: Efficacy of Albendazole and Carica papaya on the 7th and 14th day post-treatment in goats

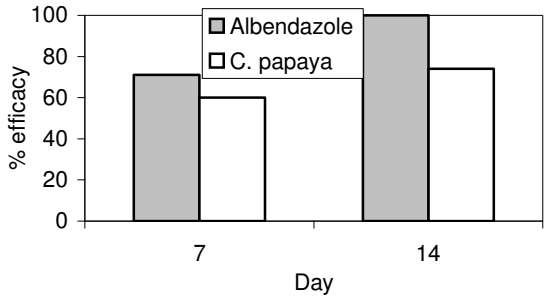

Table 2: Nematode Species Identified in the Larval Culture

Nematode species	% Proportion
Strongyloides spp	60
Haemonchus contortus	40

Analysis of variance LSD was used to evaluate the difference in the egg count on days 7 and 14 after treatment. There was a considerable reduction in the EPG of the group treated with *C. papaya* than the control group because the nematode eggs were increasing when left untreated. Groups 1 and 2 were significantly different (P<0.05) from the control group on day 7. The results of the study indicated that on the 14th day post treatment, EPG counts for the group treated with Albendazole had dropped significantly (P<0.05) to below detectable levels compared with the group treated with *C. papaya* and the control. This agrees with Fabiyi, (1975) that albendazole has an extended spectrum of activity being highly effective against adult, immature and larval stages of important nematodes.

The undifferentiated eggs in the feces provide little information as to the identity or relative abundance of worm genera present. Except for nematodirus, the eggs of the various *strongyle* species that infect goats are indistinguishable. Hence pre-treatment larval culture should be performed to identify the parasites. (McKenna, 1996). Two nematode species were identified based on the morphological description of the infective third stage Larvae (L3) by Soulsby (1982). The *Strongyloides* species was 60% and *Haemonchus contortus* 40%. Okon, *et al.,* (1977), reported that *strongyloides papillosus* was found to be one of the commonest helminthes treated at the Veterinary Clinic University of Ibadan.

In coclusion, *Carica papaya* can be a substitute for albendazole since it reduced the nematode population. Although, it is not as effective when compared with the conventional dewormers, it is readily available. For goat owners who cannot afford to treat their animals with modern antihelmintics, the use of *Carica papaya* (pawpaw) in conjunction with good management practices should be considered in the control of gastrointestinal parasites.

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