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CAN SEX INFLUENCE THE EFFECT OF POUNDED *PARKIA BIGLOBOSA* PODS EXTRACT ON STRONGYLE IN SHEEP?

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ABSTRACT: *A study was conducted to examine the influence of sex on the effect of pounded dawadawa pods extract as a sequel to a preliminary work that suggested some efficacy on strongyle in sheep. The study was undertaken from September to November, 2009. Twelve Djallonke sheep (six males and six females) randomly selected were used. The pounded Dawadawa pods extract was soaked (1kg pod/1.5 liter of water) and mixture was allowed to stand for 12 hours. The filtrate was administered orally at 0.5ml/kg and 0.6ml/kg body weight and a control. Faecal samples were taken from the experimental animals 72 hours after each administration. Laboratory analysis was run to identify strongyle ova after which counts were made. Experimental animals were blocked by sex. Ova counts of strongyle were found to have reduced significantly (P<0.01) over the study period for both dosages. However, the 0.6ml/kg body weight gave better results in worm ova counts, producing 97% reduction in ova counts as against 95% reduction in ova counts for 0.5ml/kg dosage. Control animals recorded an increase in ova counts throughout the study period. Worm ova counts were tended to be higher in females compared to that of males for both dosages. The trend was not evident in the control, suggesting some probable confounding effect of sex on the ability of Dawadawa pods extracts to act efficaciously.*

ORIGINAL ARTICLE

Keywords: *Dawadawa pods extract, sex, sheep, strongyle, worm ova counts*

INTRODUCTION

Livestock production makes numerous contributions to the lives of both rural and urban dwellers (FAO, 1991). Among the small ruminants, sheep is of more concern than goat, (FAO, 1991). In Ghana, long legged and the dwarf (Djallonke) sheep are the main breeds available (Charray et al., 1992) and are efficient meat producers in the tropics due to their high prolificacy.

However, worm infestation is one of the setbacks in producing this ruminant. Damage comes mostly from poor growth and unthriftiness (Blakely and Bade, 1994), both under semi intensive and extensive management systems. Charray et al., (1992) estimated that in Africa 97% of small ruminants are carriers of parasites of the digestive system. Helminthes undoubtedly are the most important single group of internal parasite affecting sheep productivity. This is particularly true for the strongyles (roundworms) which are most frequently endemic and usually cause varying degree of stunting rather than death, (Carles, 1983).

Control of these important internal parasites is of great concern to all farmers. However, farmers have relied over the years on orthodox medications which animals have developed immunity over (Schoenian, 2006). They are also becoming more expensive. Ethnoveterinary as an alternative method of treating internal parasites in ruminants have proofed positive in Northern Ghana as reported by Yidana et al., (2006). Iddrisu (2009) recorded substantial and significant ova count reduction in strongyle with the use of pounded *Parkia biglobosa* pods extracts in sheep. A dosage of 4mls/10 kg body weight was used. Notwithstanding the encouraging results the worms were not completely cleared, neither was the sex factor investigated. This study therefore set out to explore whether comparatively higher doses could completely clear the worms and also to examine whether sex could influence the observed effect.

MATERIAL AND METHODS

Study location

The study was undertaken on the livestock production farm of the Animal Science Department of the University for Development Studies at Nyankpala in the Tolon Kunbungu District of Ghana. It started from

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November 2008 to January 2009. The study area lies within the Guinea Savanna Zone, characterized by large areas of low grass land interspersed with trees. The area has a single pattern of rainfall which starts from May and ends in October. Nyankpala lies on altitude 183 m, latitude 09°25˝N and longitude 00°58˝W, with a mean annual rainfall of 1043.60 mm and temperature of 28.30°C. Mean annual day time relative humidity is 54%.

System of management of sheep

The main system of production is semi- intensive where the animals were provided with a well-constructed pen. The flocks were released during the day into the fields around to graze. The sheep were watered and provided with supplementary feed comprising of cassava peels.

Administration of Dawadawa Pods Extract Solution (DPES)

Treatments of the pods were in three phases;

Treatment one (T1): (0.5ml/kg live weight).

Treatment two (T2): (0.6ml/kg live weight).

Treatment three (T0) (Control): animals under this were not given the DPES. The animals were weighed before the administration of the extract and a base line was also taken to know the worm load of the animals. A syringe was used to draw the required quantity of the extract and the animals were drenched with the appropriate dose and treatment.

Faecal samples collection

The field data collected from the sheep was faecal samples. This was done by gently restraining the animal and collecting about 3-5 grams of faecal samples directly taken from the rectum through the anus by the fingers covered with gloves. The first baseline faecal samples were collected at the end of the month of September. Animals were then drenched immediately with the preparation from the pounded Dawadawa pods and after 72 hours of administration (i.e. early October) faecal samples were collected for the month of September. The process was repeated at the end of October, but faecal samples collected in early November for the month of October and similarly for November. After the collection of each sample, the gloves were changed or washed to avoid contamination. The samples were then taken to the University's Laboratory in well- cleaned and labeled plastic containers for analysis. All samples were usually taken within the early hours of 6: 00- 8:00 in the morning.

Storage of samples

In situations where examination was not immediately possible, samples were kept in a refrigerator.

Laboratory procedure for the examination of the faecal samples

The floatation technique of New South Wales Department of Agriculture (2000) for worm egg count was used in the identification of ova.

Floatation method

The modified McMaster procedure specifically used here involved taking three (3) grams of faecal samples and with the aid of the laboratory pestle and mortar; this was well emulsified with 10ml tap water. The emulsion was poured into a labeled test tube and centrifuged for 5 minutes at 3000 rpm. The supernatant was decanted and another fresh tap water was added to wash out debris. A saturated sodium chloride solution made up of 270g of sodium chloride dissolved in one liter tap water was added to sediment and mixed.

The test tubes containing the mixture of sediment and floatation fluid was filled in test tubes up to the top and arranged in the centrifuge and centrifuged for 5 minutes at 3000 rpm to deposit the debris and bring the ova to the surface. A quantity of the supernatant was drawn with a pipette from the surface of the solution to fill a McMaster Counting Chamber and examined using X10 objective lens of microscope and worm ova identified, counted and recorded.

Identification of helminthes eggs

Strongyle ova were identified by the morphology (colour, shape and size) of eggs with the aid of a microscope and with a guide from a helminthological chart.

Interpretation of egg counts

To estimate the total worm egg count in the 1g of faecal sample, the mean worm egg count was determined. The sum total of eggs seen and counted in one chamber of McMaster Counter Chamber was multiplied by a factor of 100. This represented the amount of eggs per gram of faecal samples for the individual animal. This was given as $X = Y \times 100$ (epg) where X is worm egg count per gram of faecal sample and Y is mean worm egg count of the two chambers of the Mc master slide.

Data Analysis

Data was analyzed using GenStat (Edition 3) in one way ANOVA.

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RESULTS AND DISCUSSION

Mean worm ova count during study period

The base mean worm load of 4533 epg for all experimental animals in September reduced to a low of 2026 epg upon administration of T1 (0.5ml/kg) and T2 (0.6ml/kg) (Table 1). After 4 weeks in October this average worm load shot up to 5425 epg but again come down to 3000epg on drenching. A similar trend was observed for the month of November. The fluctuation in ova counts month after month might be due to the development of resistance or exposure of the animals to open grazing where they could pick up more larvae of the worms, offsetting or eroding any meaningful impact of the DPES. Hunter, (1994) said that worms develop resistance to anthelmintics if they are administered regularly at below recommended doses and that in the tropics development of ingested larvae to adults is arrested until suitable environmental condition occur in the dry season and the onset of rains for hatching of worm eggs. The decrease in worm ova count after each administration confirms findings by Iddrisu (2009) of some degree of efficacy of the DPES.

Table 1 - Mean monthly worm ova counts for all experimental animals

Month	September		October		November	
Time of faecal sample collection	Base	72 hours later after 1st adm.	4 weeks later	72 hours after 2nd adm.	8 weeks later	72 hours after 3rd adm.
Mean worm ova count	4533	2026	5425	3000	4808	3317

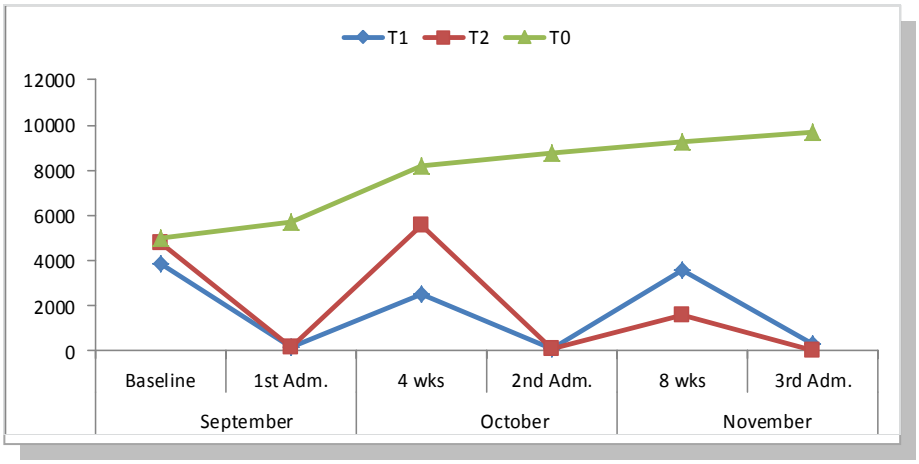

Fig. 1. Mean worm load as affected by dosage of DPES over time. Worm ova count was noted before animals were drenched and after 72 hours ova counts were again noted for the 3 months.

Mean monthly worm ova counts after each administration were significantly different ($P<0.01$) between the control (T0) on the one hand and treatments T1 and T2 on the other hand but not between T1 and T2 (Fig. 1), suggesting that the presence of tannins in the DPES administered were probably in a quantities high enough to be lethal to the worms. The mean worm ova counts however increased in week four again implying that the action of DPES against strongyle is effective for limited period, and that farmers who adopt this product may probably have to use a shorter routine than four weeks, especially under extensive management system. Mean ova counts for treatment T1 and T2 continued to decline after week four, prompting the need to probe for residual effects of DPES. On the contrary that of the control (T0) continued to rise which was to be expected as animal were on open grazing and subject to picking more ova on the pasture (Fig. 1).

Influence of sex on effect of DPES on worm ova counts

Mean worm ova counts tended to be higher in females compared to that of males in September and after administration all ova were cleared in males for T1 and T2 but not for females (Table 2), possibly because of the significant variance between female and male ova counts initially.

Table 2 - Mean Worm Ova Count for the month of September

Period	Treatment	Sex	Before administration	After administration
September	T1	Female	10000	600
		Male	5400	0
	T2	Female	13000	810
		Male	6100	0
	T0	Female	14500	15500
		Male	5400	7400

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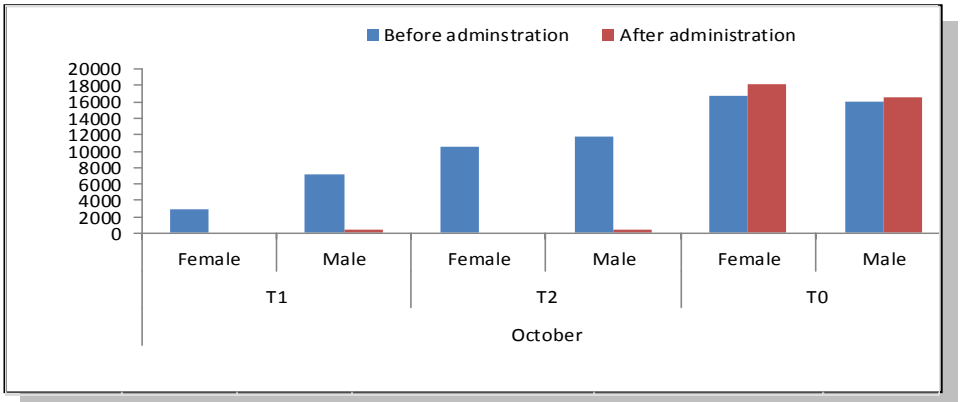

Fig. 2. Mean worm ova counts based on sex of animals

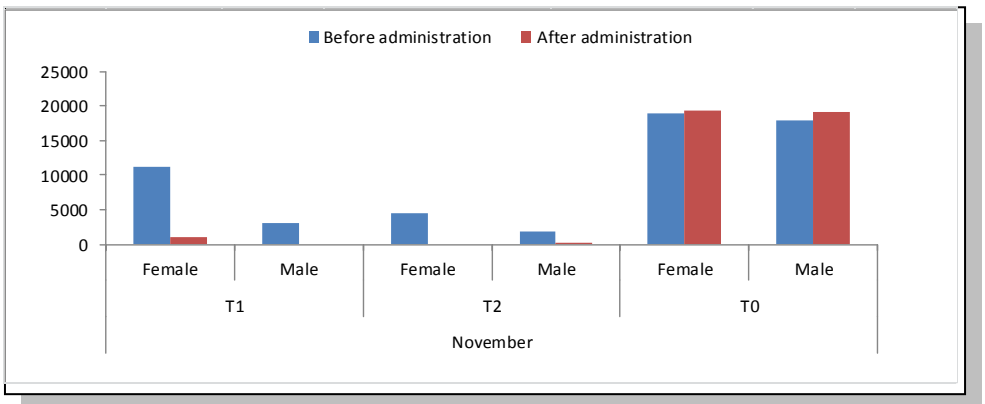

Fig. 3. Mean worm ova counts based on sex of animals after the third administration of DPES

In October, regardless of the variance in mean ova counts between females and males (though those of the males tended to be higher for T1 and T2 before administration) (Fig. 2), all ova were cleared after administration of DPES for both sexes for the two treatments (T1 and T0), except for some traces that were left in the males (Fig. 2). The opposite appeared to have occurred after the third administration of DPES in November, where the females this time round tended to have a higher ova count before treatment and a trace of ova count for T1 only after administration of the DPES (Fig. 3). It thus appears that ova count levels may have a threshold for which the DPES could completely clear worm ova depending upon the sex of the animal.

Treatment one (T1) showed some efficacy (Fig. 2 and 3), but this was not consistent for the females over the study period. Whereas all worm ova were cleared for the males after the third administration in November for T1 and T2 (Fig. 3), this was not the case for the females as some traces were left with the third administration of the lower dose T1 but T2, suggesting that females may probably require a sustained higher dose of T2 to have all their worm ova also cleared by a third administration (Fig. 3).

The higher dose of T2 (6ml/10kg of body weight) over T1 (5ml/10kg of body weight) which was also over and above what Iddrisu (2009) used (i.e. 4ml/10kg body weight) suggests that a consistent use of that dosage in both males and females could be adequate to clear the worm ova in sheep over similar periods and times. It was also noted that the lower dose of T1 (5ml/10 kg of body weight) cleared all worm ova in males by the third administration but not in the females (Fig. 3). Sex and ova count variance interaction before administration appear implicated in the observed differences after treatment and may be attributable to differences in browsing behavior. Max et al., (2003) showed that there is an effect of taniniferous browses meal on faecal egg counts and internal worm burdens with an average of 19%, which are in line with McCorkle's (1999) findings that tannin proved to reduce parasite load in sheep and goats.

Figures in parenthesis indicate an increase rather than a reduction.

It has been suggested that drug resistance could occur once worms can survive a dosage of a drench that would have previously killed them; this could possibly be influenced by sex, too. Outcomes of the second and third drenches of T1 and T2 (except for third T1 drench for the females) (Table 3) fall below Cole's (1986) standards of 500 eggs per gram (epg) being generally considered high enough to require treatment in order to limit pasture contamination and subclinical disease. The second and third T2 drenches thus seem satisfactory for both sexes. However this has to be trodden with caution as Campbell-Platt (1980) has reported that Dawadawa pods contain as much as 27-44% tannins which interact with some sensitive receptors in sheep.

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Table 3 - Percentage reduction in ova count during study period					
Periods	Treatment	Sex	Before administration (Base line)	After administration (at end of study)	Percentage Reduction
September	T1	Female	10000	600	94
		Male	5400	0	100
	T2	Female	13000	810	93
		Male	6100	0	100
	T0	Female	14500	1500	90
		Male	5400	7400	(37)
October	T1	Female	2900	0	100
		Male	7100	400	94
	T2	Female	10600	0	100
		Male	11700	500	96
	T0	Female	16700	18100	(8)
		Male	16100	17000	(6)
November	T1	Female	11300	1100	90
		Male	3100	0	100
	T2	Female	4500	0	100
		Male	1800	100	94
	T0	Female	19000	19200	(1)
		Male	18100	19200	(6)

CONCLUSION

The dosage of 6ml/10kg body weight proved consistently effective against strongyle in both sexes of sheep within a suggested interval of four weeks for subsequent drenches. The effectiveness was noticeable in a relatively shorter period, after 4 weeks for males but longer for females, after 8 weeks.

RECOMMENDATION

A minimum of 4 weeks is suggested for subsequent drenches. Females may therefore be given this higher dose of 6ml/10kg body weight while worm ova count in the males can be contained with the 5ml/10kg body weight.

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