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PLANT-BASED TREATMENT OF HELMINTHS IN CALVES

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ABSTRACT

This study examines the indigenous plants practices for the treatment of helminths in cattle among settled agro-pastoralist in Ogun and Oyo State, Nigeria. The study was a pretest-posttest design. Three sets of helminth infected cattle were each exposed to herbal treatment (Indigenous plant concoction (Group A, n=6), alverticine drug (convectional helminthic drug (Group B, n=6) orally for 1-14 days while the control group (Group C, n=6) were untreated. Faecal egg count was obtained using the Modified Mac Master and saturated salt solution technique and data was analysed using ANOVA for repeated measures. The significant effect of treatment on FEC count across the four days of treatment ($p < 0.05$) as the FEC count significantly decline across from day 1 - 4 for both the herbal than the conventional treatment groups while the control group remains chronically infected with the helminths till 12th week. FEC count significantly decline faster for convectional drug group (FEC count cleared on 2nd day) compared to the herbal group (FEC count cleared on 4th day) ($p < 0.05$). Cows exposed to herbal drug significantly (90.36±4.780) had better weight gain than those exposed to conventional treatment (85.65±7.405) while there was significant weight loss observed in the control group (76.68 ±6.435) at the 12th week. The study concludes that herbal concoctions based traditional knowledge of medicinal plants were efficacious in the treatment of helminths infestation. It is therefore recommended that regular control measure should be practiced and agro-pastoralist needed to be educated in proper usage of anti-helminths drugs and its administration.

1. INTRODUCTION

There is increased awareness of the enormous healing potentials of indigenous plants in Africa (Adesiji et al., 2014). The low investment in scientific veterinary implies that indigenous veterinary practices must be harnessed and improved upon. These indigenous veterinary practices have been in operation in bits and pieces from generation to generation, but have to become the driver for bottom-up development in cattle production for the sake of sustainability. Sustaining the aroused interest of agro-pastoralists in the use of indigenous technologies, therefore, becomes imperative.

This research is based on the hypothesis which fosters the use of collective action towards achieving a sustainable and environmental friendliness which allows stakeholders to share ideas and work together. Helminthiasis is a disease condition caused by internal parasitic worms that invade the internal organs of livestock while Helminths are endo-parasites comprising of a large and varying group of invasive parasites. According to National Animal Disease Information Service (NADIS, 2010) who ascertained that livestock industry in Nigeria is endowed with 13.8 million cattle out of which 97 percent are Zebu breeds, 34.8 million goats, 22 million sheep, 72.4 million local chicken, 11.8 million ducks, 4.8 million guinea fowls, and 3.1 million pigs. According to the study

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conducted by Mapiye and Sibanda (2005) showed that large flock sizes were raised by livestock farmers that utilized indigenous plants/technologies compared with those that used contemporary veterinary treatment. This indicated that indigenous plants/technologies could be a more efficacious alternative when used properly on livestock. This corroborates the need for researchers to take an inventory of indigenous plants used by agro-pastoralists in treating cattle with helminths infestation along with their dosages and application for them not to be lost. The success stories of indigenous technologies used in livestock management in Nigeria are corroborated by Kolawole et al. (2007); Okwoche, (2013); and Kubkomawa et al. (2013). These suggest the efficacy of these technologies on livestock rearing. Nevertheless, the innovativeness of agro-pastoralists goes a long way in determining their practice of indigenous plants.

Agro-pastoralists are expected to be persuaded enough to develop and relate with researchers on indigenous plants/technologies being used for necessary documentation because of its reported relative advantage over orthodox medicine, but their demographic, economic, social and psychological characteristics can refuse them from this opportunity. Prevalent helminths in Africa according to Keyyu et al. (2005) are Nematode; *Haemonchus, Cooperia, Bunostomum, Trichuris, Oesophagostomum, Trichuris*, and *Strongyloides. Cestodes* include; *Moneziawhile* Trematodes consists of; *Paramphistomum, Fasciola, Dicrocoelium* which are usually more pronounced in the intestine of ruminant animals. One approach common among the indigenous group for the control of helminths over diseases is the use of indigenous technology. The term 'Indigenous technology' is otherwise used when this phenomenon is based on the traditional knowledge system that is handed down orally and improved from generation to generation (Tabuti, 2003).

Essentially all herds/flocks in a grass-based production system are affected. Parasitological indices for measuring resistance include fecal egg counts and worm burden at necropsy which have been extensively used to determine the intensity of parasitic gastrointestinal helminth infections (Sreter et al., 1994 and Bisset et al., 1996). However, Fakae et al., (2004) found individual variability in West African Dwarf goats which showed outstanding positive responsiveness in FEC following experimental *H. contortus* infections. This confirmed earlier nematode resistance characteristics of some breeds of sheep measured by reduced FEC, which was found to be heritable between 0.23-0.41 (Woolaston and Piper, 1996). The practical value of the use of FEC as a measure of resistance has been demonstrated in several successful breeding programs (Gray, 1991). The study objectives are to: ascertain the efficacy of indigenous plants for the treatment of helminths compared to conventional methods of treating helminths among agro-pastoralist in the study area contamination (Sabullah et al., 2015). Nickel (Ni) is a transition metal, and considered as a significant micronutrient, always present in small quantity in animal tissues and seems to be well regulated. Nickel may cause negative impacts on fish health when present in deficiency or excess amount (Eisler, 1998; Hayat, 2007). According to Clark and Keasling (2002) Ni causes some morphological transformations in cell and chromosomal aberrations. However, Vieira et al. (2009) reported that he accumulation of Ni in aquatic organism creates acute and chronic toxicity.

Elevated level of heavy metals in aquatic ecosystem can prompt oxidative stress in aquatic life (Almeida et al., 2002). The inequality between the antioxidants activity and the creation of reactive oxygen species (ROS) result in oxidative stress (Lushchak, 2011). According to Sayeed et al. (2003) ROS can cause damage at cellular level resulted in oxidative damages enhance the diseases and also cause deaths (Iwama et al., 2011; Herrera et al., 2009). Animals have antioxidants defense system to cope with harmful effects of ROS which includes enzymes viz. superoxide dismutase, catalase and peroxidase (Jia et al., 2013). Catalase present in peroxisomes, plays a significant role in conversion of harmful free radical hydrogen peroxide to oxygen and water molecule (Dellali et al., 2001). Stress response in fish against toxicant exposure can be detected by evaluating the biochemical parameters. Now, use of these oxidative stress biomarkers has been greatly increased in ecotoxicology field. Therefore, this study was designed to relate the organs- and duration- dependent changes in catalase activity of *L. rohita* due to nickel toxicity.

2. MATERIALS AND METHODS

Experimental Site

The experiment was conducted at the Teaching and Research Farm of the Federal University of Agriculture, Abeokuta in the Derived Savannah Zone of Nigeria.

Experimental Research Design Stage

Experimental materials used in experiments to determine the survivors of helminths infection include: disposable hand gloves, acuvetsam-ple bottle, sample bottle rack, cattle fecal samples, faeces sieve and spatula, ordinary water, pasture pipette, Mac-Master slide, Light microscope, glass slide and cover slide, conic flask and saturated solution of sodium chloride. Antihelminth like Ivermectin injection was administered on experimental cattle detected with helminths as a conventional method of treating helminths. All experimental calves to be treated were tagged with numbers individually and administered with a compendium of indigenous plants as

recommended by agro-pastoralists within the axis of the University premises; the indigenous plants identified were Ficuscapensis (*Moraenae*), *Anthocleista djalonensis* (*longaniaceae*) and *Parinapari polyandra (*Chrysobalanaceae*)* as shown in Table 1. This three plants species were used outside the listed plants species that agro-pastoralist have been familiar with in the study area.

Sample examination

Faecal egg count was obtained using the Modified Mac Master and saturated salt solution technique according to Zajac et al. (2006). This produced a quantitative estimate of egg output for nematodes and cestodes and assessed faecal egg output in experimental animals. The following procedures were used to determine the faecal egg count: Flotation method and Faecal Egg Count through Modified Mac Master Technique.

Statistical analysis

The data were analyzed by Analysis of Variance (ANOVA) used to compare treatment means.

3. RESULTS AND DISCUSSION

Effect of treatment on faecal egg count

ANOVA result in Table 2 revealed the significant effect of treatment on FEC across the four days of treatment ($p < 0.05$). The FEC was also demonstrated to significantly decline across from day1 to day 4 due to treatment. Results show that conventional drug caused a significant decline between Day 1 (4300.00±788.811) to Day 3 (0.00±0.00). The herbal drug significantly cleared the worm loads between Day1 (4500.00±623.61) to Day 4 (0.00±0.00) while the no significant changes were observed in the control group. However, while the FEC increased faster after the third month for the animals in the herbal treatment group than the conventional the control remains chronically infected with the helminths.

Effect of treatment on mean weight of Cattle after 12 weeks

ANOVA result in Table 3 revealed that there is no significant effect of treatment on mean weight across the 12 weeks of treatment ($p<0.05$). It was demonstrated there was significant weight gain from week 0 to week 12 due to exposure to treatment for the cows in the herbal and conventional groups. Results show that the mean weight for cows exposed to herbal drug significantly change between week 0 (84.20 ±3.293) and week 12 (90.36±4.780). The conventional treatment significantly improves the weight gain between week 0 (83.50±7.472) and week 12 (85.65±7.405) while there was significant weight loss observed in the control group from week 0 (82.80±3.736) and week 12 (76.68 ±6.435). This indicate the efficacy of the three plants species used to reduce the FEC of helminths in the cattle among agro-pastoralist.

4. CONCLUSION

Based on the findings of the study, it could be concluded that the agro-pastoralists and resource-poor traditional farmers in Africa and many parts of the developing world widely accept the use of herbal remedies based on local plant preparations which offer an alternative to the expensive and often inaccessible or adulterated commercial anthelminthic. In essence, traditional control methods of cattle helminthiasis were found to be well established and utilized by the respondents. The study has indicated that southwest communities are rich in traditional knowledge on medicinal plants diversity and have used them to treat livestock helminthiasis and has, therefore, become a success story. Hence, indigenous plants have become the most preferred and treasured asset of the community host although their conservation is seriously threatened to local extinction.

This study therefore recommend that agro-pastoralist can come together to find ways or work-out plans to conserve and protect the loss of some useful indigenous plants identified, improving farm management system and routine deworming of farm animals is of great importance to animal production as this will reduce the rate of helminths infestation on cattle rearing husbandry, the high prevalence rate of helminthiases in livestock needed to be checked periodically to discontinue infestation of the animals with helminths, regular control measure should be practiced and agro-pastoralist on the mode of administration in order to ensure proper usage of indigenous plants/herbs and anti-helminths drugs and its administration.

5. CONFLICT OF INTEREST

All authors have declared that there is no conflict of interests regarding the publication of this article.

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Table 1. Medicinal Plants used by agro-pastoralists for the treatment of helminths

Name of the plant species	Habit	Local name	Herbarium number	Plant part(s) used	Mode of Administration
Ficuscapensis (*Moraenae*)	Stem barks	Epo-Obo	110607	bark, leaves, seeds	Bark, leaves and seed were grinded till powder form and added with salt for easy palatability, given orally a day for at least 5 days for relief of helminthes
Anthocleista djalonensis (*longaniaceae*)	Tree	Ewe Saapo	110630	bark, leaves, seeds	Bark, leaves and seed are grinded till powder and added with salt for easy palatability, given orally a day for at least 5 days for relief of helminthes
*Parinapari polyandra (*Chrysobalanaceae*)* (leaves, bark, seed)	Stem bark	Ewe Opoto	110629	Leaves with fruits	Same procedure as above

Table 2: Descriptive and mean differences showing the effect of treatment on FEC EGGS

Treatment Days	Herbal	Conventional	Control
	Mean ± SD	Mean ± SD	Mean ± SD
Day 1	4500.00 ± 623.61^{a}	4300.00 ± 788.811^{a}	4750.00 ± 1086.53^{a}
Day 2	1010.00 ± 521.643^{b}	680.00 ± 345.768^{a}	5200.00 ± 918.94^{c}
Day 3	410.00 ± 357.305^{a}	0.00 ± 0.00^{a}	5250.00 ± 824.958^{b}
Day 4	0.00 ± 0.00^{a}	0.00 ± 0.00^{a}	4990.00 ± 2247.196^{b}
1st month after	0.00 ± 0.00^{a}	0.00 ± 0.00^{a}	6700.00 ± 1159.502^{b}
2nd month after	1810.00 ± 1384.397^{b}	450.00 ± 772.082^{a}	6100.00 ± 1197.219^{c}
3rd month	2700.00 ± 1358.103^{a}	2370.00 ± 1531.920^{a}	6800.00 ± 1229.273^{b}

*Means with different subscript are significantly different from each other at 0.05 level of significance.

Table 3: Descriptive and mean differences showing the effect of treatment on the mean weight of cattle after 12 weeks

Treatment	Herbal	Conventional	Control
Weeks	Mean ± SD	Mean ± SD	Mean ± SD
0 week	84.20 ± 3.293a	83.50 ± 7.472a	82.80 ± 3.736[a]
2 weeks	86.68 ± 5.347[c]	83.00 ± 7.777[b]	80.54 ± 7.637[a]
4 weeks	87.17 ± 5.166[c]	83.65 ± 7.587[b]	78.05 ± 8.120[a]
6 weeks	87.99 ± 5.193 [c]	84.51 ± 7.359[b]	76.37 ± 7.534[a]
8 weeks	90.80 ± 3.810 [c]	85.25 ± 7.144[b]	76.55 ± 7.162[a]
10 weeks	89.81 ± 5.130 [c]	86.23 ± 7.014[b]	77.59 ± 6.224[a]
12 weeks	90.36 ±4.780 [c]	85.65 ±7.405[b]	76.68 ±6.435[a]

*Means with different subscript are significantly different from each other at 0.05 level of significant