

# The use and misuse of nematocides in Ibadan area of Nigeria: misuse effects on therapeutic efficacy in small ruminants - a survey

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## Key words

Sheep - Goat - Anthelmintics - Use - Efficiency - Survey - Nigeria.

## Summary

A survey was carried out to determine the currently used nematocides in small ruminants and to assess the modes of their use in relation to other husbandry practices. Eight nematocides were in common use. Fifty-four percent of the respondents determined dosages by visual estimation of their animals' weight. Moreover, 87.5% of the farmers and miscellaneous percentages of other professionals associated with livestock production had no knowledge of the helminth epidemiology, and 33% depended solely on clinical signs as indications to use nematocides. Dosing intervals varied from 2-6 months. Nematocide misuse originated at times from incorrect dosages and unnecessary dosing. Animals were dosed unnecessarily because of the lack of knowledge of the helminth epidemiology, poor management practices and reliance on tentative diagnosis as indication for treatment. This misuse might be responsible for the discrepancy between observed and advertised efficacy of the drugs in many cases.

## ■ INTRODUCTION

There are 26.7 million goats in Nigeria (2). Goats outnumber sheep by 3 to 1 (4). Small ruminants are becoming more prominent in the Nigerian livestock industry than they were a few decades ago (4, 5). The control of gastrointestinal parasites is essential to the viability and economic production of this livestock group (7, 11).

Chemotherapy has been a major tool in controlling gastrointestinal parasites. However, anthelmintic resistance has since been observed and could become a major problem in animal production (8, 9). This situation calls for the proper use of parasite control anthelmintics. Current research has led to the production of drugs which are highly active against intestinal nematodes of ruminants.

There is a need to understand whether these drugs are properly used since misuse could result in drug resistance and the consequent failure to achieve the desired goal.

This survey was carried out to determine the currently available nematocides in the Nigerian market, their modes of application, possible areas of misuse, and also to determine whether appropriate therapy methods combined with proper animal husbandry systems were applied, so that small ruminant production could benefit most of anthelmintic therapy.

## ■ MATERIALS AND METHODS

The survey was conducted at Ibadan, a south western town in Nigeria, by direct interviews and a questionnaire. Of the 250 copies of the questionnaire sent out, some were completed by direct interviews of the respondents, when such respondents were illiterate livestock owners. A total of 231 questionnaires were returned with 197 of them interpretable. Among the respondents

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14% were veterinary surgeons involved in livestock farming, 11% worked in veterinary drug retail outlets, 38% were livestock farmers/owners, 27% were ambulatory veterinarians and 10% were animal health attendants.

The interviews and questionnaire were designed to obtain the following information: location of farms or clinics, pasture management systems in livestock farms and how they affect worm control programs, farm size and husbandry practices, commonly used nematocides and factors influencing the choice of nematocides, relative availability of nematocides, relative knowledge of the worm epidemiology by those using nematocides in helminth control, indications for treatment (use of nematocides), dosage forms commonly used, dosage rates commonly applied and how they were determined, modes of administration, individual evaluation of the efficacy of the drugs they used, toxic effects (if any) following drug administration and readiness to change to other or new nematocides.

## ■ RESULTS

### *Farm and pasture management*

The survey revealed that 18, 68 and 14% of farmers operated extensive, semi-intensive and intensive production systems,

respectively. Of the 86% who practiced extensive and semi-intensive husbandry methods, 6% practiced pasture management, while 80% did not manage their pasture.

### *Commonly used nematocides*

The survey showed that only eight types of nematocides under different proprietary names were commonly used by respondents. The selection of any product was based on factors such as availability, recommendation and choices. Table I shows the list of available nematocides and factors that influenced the respondents' choice.

### *Dosage forms, administration and dosage evaluation*

Forty-eight percent of respondents used weighing scales to determine body weight for the calculation of dosages, while 54% did a visual estimation of the animal body weight. Responses from the group that had access to the scales indicated that they were inconsistent in their use of the instrument facility. The estimation of body weight based on linear body measurements (body weight, height at withers and heart girth) (3) was unpopular.

The commonest dosage form available was soluble drench. Fifty-one percent of respondents administered nematocides orally as drench; 27% admitted grinding tablets and boluses and administered them as drench; 22% of respondents preferred parenteral administration.

Table I

Commonly used anthelmintics in small ruminants and factors influencing their selection

S/N	Anthelmintics	Indications (Invading parasites)	Numb. of users (%)	Factors influencing the selection		
				Availability (%)	Recommendation (%)	Choice (%)
1	Albendazole	Roundworms, tapeworms, lungworms and adult liver flukes	22	-	77	23
2	Piperazine	Ascarids	11	50	25	25
3	Pyrantel	Adult gastrointestinal nematodes and larva stages in the lumen and mucosa surface	8	-	75	25
4	Levamisole	Ova larvae and adults of lungworms, strongyles, <i>Strongyloides</i> and trichostrongyles	50	23	42	35
5	Avermectin	Lungworms and most gastrointestinal nematodes, including adult and larva forms of <i>Ostertagia</i> , <i>Trichostrongylus</i> , <i>Oesophagostomum</i> and <i>Haemonchus</i> species	8	-	100	-
6	Morantel	Adult gastrointestinal nematodes and larvae	31	15	29	56
7	Thiabendazole	Adult and larva stages of most gastrointestinal nematodes	6	-	50	50
8	Organophosphate	Abomasal and intestinal nematodes such as adult <i>Haemonchus</i> , <i>Trichostrongylus</i> , <i>Cooperia</i> and <i>Strongyloides</i> species	3	-	100	-

### *Nematocide users' knowledge evaluation of the helminth epidemiology*

The survey revealed that 80% of the veterinarians questioned had knowledge of the helminth epidemiology, while 88% of the livestock farmers/owners were not aware of it; 12% of the livestock farmers/owners and 55% of animal health attendants had some knowledge of the worm epidemiology they attempted to control.

### *Indication for the use of nematocides*

All respondents relied on clinical signs as indications for nematocide administration, but 61% would sometimes carry out laboratory tests to confirm their diagnoses and 33% depended solely on these clinical signs. Before they would initiate treatment 6% of respondents always did laboratory tests to confirm a helminthosis diagnosis.

### *Times of treatment and effect duration*

Figure 1 shows the monthly use of nematocides by respondents. Ninety percent of respondents admitted that they administered nematocides during most months of the year except in January and November. Peak use of nematocides was between March and September. The survey also revealed that 19% of users claimed that the duration of the nematocide effects was two months, while 67% claimed effective periods of three months. Smaller percentages of users (4.5 and 9.5%) claimed that the action duration of their nematocides was 4 months and 5-6 months, respectively.

### *Efficacy and toxicity*

In this study, 65.5% of respondents agreed that the efficacy of the nematocides they used was in line with the advertised efficacy, while 37.5% observed a discrepancy between advertised and actual efficacy. The latter group revealed that the nematocides of their choice were less efficacious than the manufacturer's claim. Eighty-one percent of respondents were satisfied with the safety levels of the nematocides because of the absence of toxic signs, while 19% reported the presence of toxic signs following the administration of levamisole and albendazole.

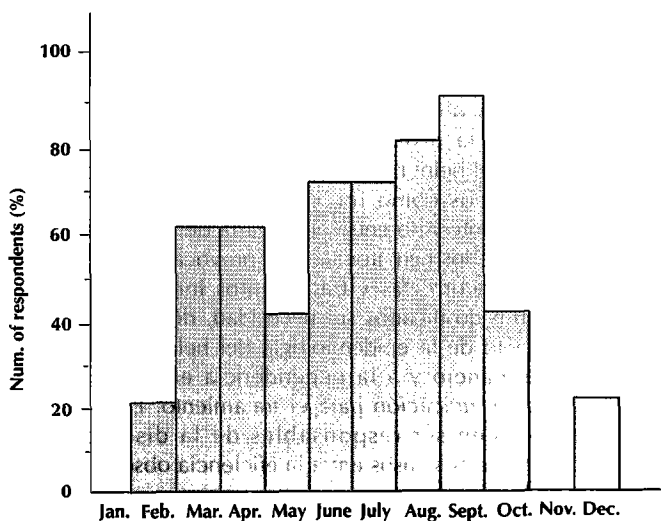


Figure 1: monthly use of anthelmintics.

### *Readiness to change nematocides*

The survey revealed that 65.5% of respondents were not willing to change the nematocides they currently used. Of the 34.4% who were willing to change, 20% would do so if improved efficacy was guaranteed, 10.3% would change to avoid development of anthelmintic resistance, while 3.4% would only change if their nematocides were contraindicated under some conditions like during pregnancy.

### ■ DISCUSSION

The results of this survey show that 86% of livestock farmers practiced extensive and semi-intensive animal husbandry and among them 80% did not practice pasture management. The permanent use of grazing land all year round favored heavy pasture contamination and exposure of animals to helminth eggs and infective larvae. This was particularly true of the semi-intensive husbandry system in which animals were left in relatively large numbers in enclosed pastures.

The extensive husbandry system is a feature of the traditional herds in which small numbers of animals are kept to forage extensively or, in some localities, are tethered each day on fresh land. Under the extensive system, feces are spread over a wide area and chances of susceptible animals encountering and ingesting infective worm larvae are considerably less than those of semi-intensive systems (4).

Pasture lack of management could result in a heavy dependence on anthelmintics in the control of helminth infections.

It has been shown that frequent anthelmintic treatments result in the selection of resistant worm genotypes (8, 10). During a survey, it was revealed that animals in locations where a semi-intensive husbandry system was practiced showed anthelmintic resistance. The presence of drug resistant nematodes may well be the reason why 37.5% of respondents revealed a discrepancy between stated and actual efficacy of the nematocides they used.

The apparent failure of nematocides to reach expected efficacy levels may also be due to misuse resulting from lack of adequate knowledge of the helminth epidemiology. For instance, this survey revealed that 20% of veterinarians and a staggering 87.5% of livestock farmers worried little about the helminth epidemiology they wanted to control with anthelmintics. A proper knowledge of the worm epidemiology is essential for the design of an effective treatment regimen of control measures since treatment at too frequent or too distant intervals could result in the emergence of resistant helminths. In addition, too frequent uses of anthelmintics are uneconomical.

A successful therapy requires the administration of adequate drug dosages if drug resistance, toxicity and ineffectiveness are to be avoided. In this survey, 54% of respondents admitted that the nematocide doses they administered were based on visual estimation of the animals' weights. These estimates resulted in drug doses being administered on bases that could significantly differ from real values. Hence the observed efficacy of the drug might vary from what was expected. Accurate livestock weights are essential not only for therapeutic nematocide efficacy but also as a monitor of productive efficiency.

Thirty-three percent of respondents relied solely on clinical signs as indications to use nematocides, while 61% seldom confirmed diagnosis by laboratory tests. This situation may be due to the dearth of diagnostic facilities. However, it suggests unnecessary

frequent treatments since other conditions showed signs similar to helminth infections. These unnecessary treatments mean unneeded expenses, and could lead to anthelmintic resistance. Furthermore, to rely on treatments to salvage animals already parasitized is uneconomical since considerable production losses would have occurred before treatment was initiated (1).

There was a disagreement among respondents about nematocide dosing intervals. The action duration of nematocides was found to be 2, 3, 4 and 4-6 months by 16, 67, 4.5 and 9.5% of respondents, respectively. Variations in the nematocide effective period and hence the dosing intervals may be due to variations in management practices, diagnostic efficiency, drug resistance or variation in the choice of drugs.

This survey shows that effective therapeutic nematode management can be mainly achieved by the proper use of available nematocides, and not necessarily by the introduction of new drugs. The proper use of available drugs requires good livestock management, provision of adequate diagnostic facilities and continuing education for livestock owners, farm managers and practicing veterinarians.

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### Résumé

**Obemeasor R.E., Eghianruwa K.I., Akintola A.A.** Utilisation et mauvais usage de nématocides dans la région d'Ibadan au Nigeria : conséquences du mauvais usage sur l'efficacité thérapeutique chez les petits ruminants - une enquête

Une enquête a été menée pour déterminer quels étaient les nématocides couramment utilisés chez les petits ruminants et évaluer leur mode d'utilisation par rapport à d'autres pratiques d'élevage. Huit nématocides étaient communément employés. Chez 54 p. 100 des personnes interrogées les dosages étaient déterminés par une estimation visuelle du poids des animaux. De plus, 87,5 p. 100 des éleveurs et des pourcentages divers d'autres professionnels associés à la production animale ne savaient pas qu'il y avait une épidémiologie d'helminthes, et 33 p. 100 se fiaient uniquement aux manifestations cliniques comme signaux pour utiliser des nématocides. Les intervalles entre les traitements variaient de 2 à 6 mois. Le mauvais usage de nématocides provenait parfois de dosages incorrects et de traitements inutiles. Les animaux étaient traités inutilement par manque de connaissance de l'épidémiologie d'helminthes, ou à cause de mauvaises pratiques de gestion ou d'une dépendance de diagnostics aléatoires comme indicateurs de traitements.

**Mots-clés :** Ovin - Caprin - Anthelminthique - Utilisation - Efficacité - Enquête - Nigeria.

### Resumen

**Obemeasor R.E., Eghianruwa K.I., Akintola A.A.** Uso y abuso de nematocidas en el área de Ibadán de Nigeria: efectos del uso incorrecto sobre la eficiencia terapéutica en pequeños rumiantes - una encuesta

Se llevó a cabo una encuesta, con el fin de determinar los nematocidas utilizados comúnmente en los pequeños rumiantes, así como para verificar el tipo de utilización de estos productos en relación con otras prácticas zootécnicas. Se encontraron ocho nematocidas en uso. Cincuenta y cuatro por ciento de los interrogados determinan la dosis por estimación visual del peso de los animales. Aún más, 87,5% de los finqueros y diversos porcentajes de otros profesionales asociados con la producción animal no conocían la epidemiología del helminto y 33% dependían únicamente de los signos clínicos como indicación para el uso de los nematocidas. El intervalo entre dosis varía de 2 a 6 meses. El uso incorrecto de los nematocidas fue provocado a veces por dosificaciones incorrectas y tratamientos innecesarios. Los animales fueron dosificados sin necesidad, debido a la falta de conocimiento de la epidemiología del helminto, a malas prácticas de manejo y a la dependencia en diagnósticos tentativos como indicación para el tratamiento. Estos signos de abuso pueden ser responsables de la discrepancia observada en muchos casos entre la eficiencia observada y la esperada de las drogas.

**Palabras clave:** Ovino - Caprino - Antihelmíntico - Uso - Eficacia - Encuesta - Nigeria.