

## PREVALENCE OF CAPRINE STRONGYLE INFECTION AND THE DIAGNOSTIC EFFICACY OF SOME MEDIA FOR FAECAL CULTURE AND NEMATODE LARVAL RECOVERY FROM GOAT FAECES

NWOSU, Chukwunyere Okwudiri<sup>1</sup>, IWUOHA, Chimaobi Lawrence<sup>2</sup>, TORRU, Churchill<sup>2</sup> and MOHAMMED, Ali<sup>1</sup>

<sup>1</sup>Department of Veterinary Microbiology and Parasitology, University of Maiduguri, P.M.B. 1069 Maiduguri, Borno State, Nigeria

<sup>2</sup>Department of Biological Sciences, University of Maiduguri, P.M.B. 1069 Maiduguri, Borno State, Nigeria.

**Corresponding Author:** NWOSU, C. O., Department of Veterinary Microbiology and Parasitology, University of Maiduguri, P. M. B. 1069 Maiduguri, Borno State, Nigeria. Phone: (+234) 0803-4535510. E-mail: [abiamaiduguri@yahoo.com](mailto:abiamaiduguri@yahoo.com)

### ABSTRACT

*The prevalence of caprine strongyle infections and the diagnostic efficacy of some culture media in supporting the recovery of strongyle larvae were evaluated using 840 faecal samples collected from goats during slaughter at Maiduguri Metropolitan abattoir. Faecal examination conducted by the modified McMaster technique revealed that out of 840 goats examined, 708 (83.8 %) shedded strongyle eggs in their faeces. The prevalence of infection was significantly ( $P < 0.05$ ) higher among female, young and diarrhoeic goats than their corresponding male, adult and non-diarrheic counterparts. Faecal culture and larval recovery using the test tube filter paper technique revealed that the direct culture of faecal samples without any additional culture medium supported the recovery of the largest number of nematode infective larvae from the faeces. When this was used as a standard (100% egg hatch or 0% reduction in egg hatch), larval recovery was highest ( $P < 0.05$ ) from goat faeces (98.4 %) followed respectively by sheep faeces (57.7 %), cow faeces (52.4 %), horse faeces (42.3 %) and soil (18.6 %) as culture media. The results therefore indicate the superior diagnostic quality of goat faeces as a culture medium for the recovery of infective nematode stages in goat faeces.*

**Keywords:** Strongyle infection, Faecal culture media, Culture media Efficacy, Goat.

### INTRODUCTION

Among the domesticated small ruminants in Nigeria, goats are much more important in meat production and research purposes than sheep due to their larger population and the wider acceptability of goat meat by the people (ILCA, 1979; Omeke, 1988). However, gastrointestinal helminthiasis, especially parasitic gastroenteritis (PGE) is a major health problem and a serious constraint on the production of small ruminants in Nigeria as a result of the associated morbidity, mortality and cost of treatment and control (Schillhorn van Veen, 1973; Akerejola *et al.*, 1979). In Nigeria, about 20 % of the national goat population die or are slaughtered *in extremis* annually due to helminthiasis (Kuil, 1969). PGE is a complex of diseases contributed to by several nematodes in which *Haemonchus*, *Trichostrongylus*, *Oesophagostomum* and *Gaigeria* species usually predominate in field outbreaks among cattle and small ruminants in Nigeria (Schillhorn van Veen, 1973; Anosa, 1977; Chiejina, 1986, 1987; Nwosu *et al.*, 1996 a,b)

Effective control of PGE depends on efficient diagnosis and establishment of the causative parasites among others. Several methods are available for the diagnosis of PGE but the traditional coprologic examination for nematode ova is the oldest, simplest and most widely used technique for

PGE diagnosis in cattle and small ruminants (Soulsby, 1982; Chiejina, 1987; Blood *et al.*, 1995). However, as a diagnostic technique, coprologic examination lacks specificity since the eggs of most of the nematodes (Trichostrongylids) responsible for PGE are similar in morphology and thus difficult to distinguish from one another. Consequently, the only means of reaching specific diagnosis is to conduct faecal culture, larval recovery and larval identification (Soulsby, 1982; Chiejina, 1987).

Although faecal materials from small ruminants may be cultured directly, in most cases they are mixed with other sterile media to enhance bulk, egg hatchability and larval emergence. Larval recovery from such media has been variable (Nwosu, 1995). In this study, some frequently used culture media were evaluated to determine their efficacy in promoting egg hatchability and larval recovery from the faeces of goats naturally infected with trichostrongylids.

### MATERIALS AND METHODS

**Collection and Preparation of Culture Media:** Faecal culture media were collected from cattle, sheep and goats maintained at the University of Maiduguri Teaching and Research Farm and horses belonging to the Mounted Troops of the Borno State Command of the Nigeria Police Force. In each case,

faecal samples were collected directly from the rectum after confirming that the animals had not been treated with any anthelmintic agent for at least four weeks prior to the study. Soil samples were collected from the University of Maiduguri compound.

About 500 grams of each culture medium was sterilized by autoclaving at 120 °C for 30 minutes. They were oven-dried overnight at 60 °C and individually ground into powder using a Phillips Twist HR 1707 blender. The samples were stored in sealed polythene bags until used.

### Collection and Processing of Test Faecal Samples:

Test faecal samples were collected directly from the rectum of 840 goats during slaughter and evisceration at the Maiduguri Metropolitan abattoir. The age, sex and health status of the goats were noted. Goats aged six months or below were regarded as young while those above that age range were recorded as adult. Animals that had obvious signs of diarrhoea such as pasting of the hindquarters with watery faeces were regarded as diarrheic. Faecal samples were collected into polythene bags and transported to the laboratory for processing.

Faecal examination and egg counts followed the modified McMaster technique using saturated sodium chloride solution as the floating medium (MAFF, 1977). Faecal culture and larval recovery were conducted using the test tube filter paper method (Harada and Mori, 1955). Faecal cultures were made in triplicates per media type and the average larval recovery taken for each culture medium. In all cases, the identification of nematode ova and infective larvae were based on standard criteria (MAFF, 1977; Sloss and Kemp, 1978; Soulsby, 1982).

**Data Analysis:** Data obtained during the study were summarized as Means  $\pm$  S.D. or in percentages. Statistical differences in the means were determined at the 5% level of significance using the analysis of variance (ANOVA) and Fisher's Exact Test (GraphPad, 1998).

## RESULTS

The prevalence of strongyle eggs in the goats examined during the study is presented in Table 1. Out of the 840 faecal samples examined, 704 (83.8%) contained strongyle eggs. The prevalence of infection was significantly higher among female, young and diarrhoeic goats than their corresponding male, adult and non-diarrheic counterparts ( $P < 0.05$ ).

Egg hatch and larval recovery from the various culture media are shown in Table 2. Larval recovery from direct culture of the faecal samples without any culture medium (Control sample) revealed a range of 42 - 1,915 with a mean of  $688 \pm 507$  larvae. When this was used as a standard (100% egg hatch or 0% reduction in egg hatch), larval recovery was significantly highest ( $P < 0.05$ ) from goat faeces than any other culture media evaluated during the study.

**Table 1: Prevalence of strongyle nematode eggs in goat faeces examined at Maiduguri, Nigeria**

	<i>Number examined</i>	<i>Number (%) infected</i>
<b>All goats</b>	840	708 (83.8)
<b>Age</b>		
Young	580	560 (96.5) <sup>a</sup>
Adult	260	144 (55.4) <sup>b</sup>
<b>Sex</b>		
Male	608	497 (81.7) <sup>b</sup>
Female	232	207 (89.2) <sup>a</sup>
<b>Health status</b>		
Diarrheic	320	314 (98.1) <sup>a</sup>
Non-diarrheic	520	390 (75.0) <sup>b</sup>

<sup>ab</sup>Figures with different superscripts in the same column for sex, age and health status are significantly different ( $P < 0.05$ ).

## DISCUSSION

The results of this study revealed that strongylid nematode infections are highly prevalent in goats in the study area. The prevalence of 83.8% recorded in the study is similar to the range of 77 - 100% reported from other geographical zones of Nigeria (Fagbemi and Dipeolu, 1982; Chiejina, 1986; Nwosu *et al.*, 1996 a,b).

The results also revealed that the type of media used for culturing strongyle nematode eggs significantly ( $P < 0.05$ ) influenced the number of eggs that hatch and thus the number of infective larvae that may be recovered. In the present study where various culture media were used and the samples subjected to similar environmental conditions, most number of infective larvae were recovered from eggs cultured in goat faeces. Preparasitic nematode stages in the environment are known to require optimal conditions of moisture, oxygen tension and warmth for their development, growth and survival (Soulsby, 1982). Since the eggs in the various culture media were subjected to similar environmental conditions, it means that the variations in the number of infective larvae harvested reflected the actual capacity of the various culture media to support the development and hatching of nematode eggs as well as the eventual survival of the hatched larvae to the infective stage.

Generally, only moist and crumbly but not really wet faecal materials are ideal for culture to recover infective larvae (Kaufman, 1996). Consequently, faecal samples that are either very dry or very wet are usually mixed with water or other culture materials respectively to bring them to the ideal consistency for culturing. In this regard, charcoal, peat moss and vermiculite have been used as culture media (Kaufman, 1996). Presently, in Nigeria, these culture media are either scarce or expensive and thus not readily available for faecal culture and larval recovery for routine diagnostic or research purposes. Consequently, faecal materials from other domestic animals, especially horses and cattle are commonly used for this purpose in Nigeria. The results of this study therefore highlight the superior quality of goat faeces for the culture of faecal samples from the goat.

**Table 2: Larval recovery from ovine strongyle eggs cultured in various culture media**

Culture medium	Larval hatch Mean $\pm$ S.D.	Range	% larval hatch	% reduction in larval hatch
Direct (control)	688 $\pm$ 507	42 - 1915	100	0*
Soil	128 $\pm$ 186 <sup>e</sup>	7 - 580	18.6	81.4
Cow faeces	360 $\pm$ 300 <sup>d</sup>	3 - 854	52.4	47.6
Goat faeces	677 $\pm$ 652 <sup>a</sup>	6 - 1855	98.4	1.6
Sheep faeces	397 $\pm$ 407 <sup>c</sup>	1 - 1067	57.7	42.3
Horse faeces	487 $\pm$ 470 <sup>b</sup>	3 - 1382	42.3	29.2

\*Direct culture was used as control and standard (0% reduction in larval hatch) <sup>abcde</sup>Figures with different superscripts in the same column are significantly different (P<0.05).

## REFERENCES

- AKEREJOLA, O. O., SCHILLHORN VAN VEEN, T. W. and NJOKU, C. O. (1979). Ovine and caprine diseases in Nigeria: a review of economic losses. *Bulletin of Animal Health and Production in Africa*, 27: 65 - 70.
- ANOSA, V. O. (1977). Observations on the helminthiasis caused by *Haemonchus contortus* in Nigerian Dwarf Sheep. *Tropical Animal Health and Production*, 9: 11 - 17.
- BLOOD, D. C., HENDERSON, J. A., RADOSTITS, A. M. AND ARUNDEL, J. A. AND GAY, C. C. (1995). *Veterinary Medicine*. 5<sup>th</sup> edn. Bailliere Tindall, London pp. 750 - 798.
- CHIEJINA, S. N. (1986). The epizootiology and control of parasitic gastro-enteritis of domesticated ruminants in Nigeria. *Helminthological Abstracts (Series A)*, 55: 413 - 429.
- CHIEJINA, S.N. (1987) Parasitic gastroenteritis in cattle and small ruminants: pathogenesis, diagnosis and treatment. *Zariya Veterinarian*, 2: 45 - 64.
- FAGBEMI, B. O. AND DIPEOLU, O. O. (1982). Strongyle infection of small ruminants in Nigeria. *Veterinary Parasitology*, 110: 347 - 353.
- GRAPHPAD, (1998). GraphPad Software, InStat guide to choosing and interpreting statistical tests, 1998, GraphPad Software, Inc., San Diego California USA, www.graphpad.com.
- HARADA, Y. AND MORI, O. (1955). A new method for culturing Hookworm. *Yonago Acta Medica*, 1: 177 - 179.
- ILCA, (1979). *Small ruminant production in the humid tropics*. International Livestock Centre for Africa, Addis Ababa, Ethiopia, 122 pp.
- KAUFMAN, J. (1996). *Parasitic infections of domestic animals: a diagnostic manual*. Birkhauser Verlag, Basel, Switzerland. 451 pp.
- KUIL, H. (1969) Livestock development and parasites. *Proceedings of the Conference on Livestock Development in the dry and intermediate savanna zone*, Zaria, 1969.
- MAFF, (1977) *Manual of Veterinary Parasitological Laboratory Techniques*. Technical Bulletin No. 18, Ministry of Agriculture, Fisheries and Food, London. 129 pp.
- NWOSU, C. O. (1995) The clinical parasitology and immunology of natural and experimental haemonchosis in Red Sokoto (Maradi) goats Ph.D. thesis, University of Ibadan, Ibadan, Nigeria.
- NWOSU, C. O., OGUNRINADE, A. F. AND FAGBEMI, B. O. (1996a). The seasonal prevalence of *Haemonchus* species in Red Sokoto (maradi) goats in Nigeria. *Veterinary Research Communications*, 20: 367 - 370.
- NWOSU, C. O., OGUNRINADE, A. F. AND FAGBEMI, B. O. (1996b). Prevalence and seasonal changes in the gastro-intestinal helminths of Nigerian goats. *Journal of Helminthology*, 70: 329 - 333.
- OMEKE, B. C. O. (1988). Improving goat productivity in the humid zone of the tropics. *Bulletin of Animal Health and Production in Africa*, 36: 126 - 130.
- SCHILLHORN VAN VEEN, T.W. (1973) Small ruminant health problems in Northern Nigeria with emphasis on the helminthiasis. *Nigerian Veterinary Journal*, 2: 26 - 31.
- SLOSS, W. M. AND KEMP, L. R. (1978). *Veterinary Clinical Parasitology*. 5<sup>th</sup> edition, Iowa State University Press, Ames, Iowa, pp 148 - 219.
- SOULSBY, E.J.L. (1982). *Helminths, Arthropods and Protozoa of domesticated animals*. 7<sup>th</sup> edn., Bailliere Tindall and Cassel, London 809 pp.