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SURVEY FOR DRUG-RESISTANT TRICHOSTRONGYLE NEMATODES IN TEN COMMERCIAL GOAT FARMS IN WEST MALAYSIA

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SUMMARY

The prevalence of drug-resistant parasites in goats in West Malaysia has rarely been reported. Ten commercial goat farms were surveyed for resistance to anthelminthics by measuring the reduction in faecal egg counts (FECs) after treatment with levamisole, pyrantel pamoate and fenbendazole. Resistance to fenbendazole was seen in most farms; there was no evidence of resistance to levamisole but some resistance to pyrantel pamoate was detected on one farm. The significance of the findings are discussed.

INTRODUCTION

The development of anthelminthic resistance is a continuing problem for control of nematodes in ruminants. In Europe and Australia, field surveys have documented the development in some species of trichostrongyle nematodes which are resistant to morantel tartrate, levamisole, organophosphates and the benzimidazole group of drugs (Taylor and Hunt, 1980; Cawthorne and Cheong, 1984; Riffkin *et al.*, 1984; Webb *et al.*, 1979). In Malaysia, earlier reports have indicated thiabendazole resistance in Malaysian goats (Rahman, 1994). Surveys for levamisole and other benzimidazole resistant parasites have not been reported in the country, and this paper describes a survey for drug-resistant nematodes in some commercial goat farms in Malaysia.

MATERIALS AND METHODS

Experimental animals

Ten commercial goat farms were selected, with a flock size ranging from 63 to 137 goats. All goats were of the same local indigenous breed, raised solely for meat. All flocks were known to have been treated with albendazole, at least twice a year, at 10 mg/kg body weight. From each farm, goats were allocated into 3 treatment groups of 10 goats.

Anthelminthic

Three drugs were used in the study: fenbendazole (10 mg/kg body weight), pyrantel pamoate (25 mg/kg body weight) and levamisole (8 mg/kg body weight). All drugs were administered orally. At each farm, the 3 anthelminthics were administered to the treatment groups in one trial.

Faecal egg counts (FECs) and cultures

Prior to drug administration, faecal samples were collected from each goat. Egg counts were determined using the universal flotation technique (Whitlock, 1948). Two replicate counts were carried out and the mean value of the 2 recorded. The

pre-treatment faecal samples were also cultured. All faecal samples from each farm were pooled, broken into pieces in a petri dish partially filled with distilled water, and smeared on a wet filter paper of approximately 14 × 12 cm, but leaving about 4 cm of each end free. The filter paper was then rolled and placed into a glass tube, 210 mm × 30 mm diameter, half-filled with 3 ml of distilled water, closed with a rubber stopper, and incubated at 30°C for 7 days. After incubation, the filter paper was removed from the test tube and the sides of the tube were washed with distilled water to wash down any larvae to the bottom of the test tube. One hundred larvae taken at random from the culture tube were identified according to the descriptions of Dikmans and Andrews (1933) and Gordon (1933).

Post-treatment FECs were determined one week after drug administration. Mean post- and pretreatment FECs were compared for each treatment group in each farm, and the percentage change in pretreatment FEC was calculated for each group. Post-treatment larval culture was also carried out at the end of the trial.

RESULTS

Pretreatment larval cultures indicated that the predominant species found in these farms were *Haemonchus contortus* and *Trichostrongylus colubriformis*. *Oesophagostomum* spp. and *Cooperia* spp. were found in small numbers.

Table I shows the FEC reduction after administration of the 3 anthelminthics. The ranges of post-treatment FEC reductions were 92·8 to 100% for levamisole, 82·7 to 100% for pyrantel pamoate, and 12·3 to 90·3% for fenbenzazole; a reduction of 90% and more being observed on only 2 farms after fenbendazole treatment.

The results of post-treatment larval culture indicated that the species of parasite surviving administration of fenbendazole was *H. contortus*.

DISCUSSION

Faecal egg count reduction tests have been established as a suitable means for detecting anthelminthic resistance in the field (Martin *et al.*, 1989; Love *et al.*, 1989), and a reduction of 80% or less after treatment is indicative of resistance (Coles, 1983; Martin *et al.*, 1989).

TABLE I

Mean FECs in goats pre- and post-treatment with three different anthelminthics on ten commercial farms

	Levamisole		Pyrantel pamoate		Fenbendazole	
Farm	pre-	post-	pre-	post-	pre-	post-
1	1870	40 (97·8)*	3280	16 (99·5)	1320	870 (34·1)
2	2040	9 (99·5)	760	0 (100)	3270	1090 (66·7)
3	840	60 (92·8)	2450	13 (99·5)	2155	983 (54·4)
4	1760	43 (97·6)	1350	234 (82·7)	876	387 (55·8)
5	3020	115 (96·2)	910	40 (95·6)	1754	689 (60·7)
6	2760	132 (95·2)	3780	112 (97·0)	2350	80 (96·6)
7	600	10 (98·3)	2100	87 (95·9)	1385	134 (90·3)
8	2090	0 (100)	1340	28 (97·9)	2680	2333 (12·9)
9	1650	34 (97·9)	3010	230 (92·4)	3765	3120 (17·1)
10	1120	8 (99·3)	920	35 (96·2)	1000	877 (12·3)

*Data in brackets denote the percentage reduction.

This investigation revealed resistance to fenbendazole in trichostrongyles of goats in Malaysia. Though the results do not provide an overall estimate of the prevalence of anthelminthic resistance in Malaysia, they suggest that this problem is becoming widespread as similar observations have been reported in other parts of the world (Donald, 1983; Webb *et al.*, 1979; Miller and Baker, 1980). The study flocks harboured a fenbendazole resistant strain of *H. contortus* indicating they had previous exposure to either fenbendazole itself or other benzimidazole, or pro-benzimidazole anthelminthics. This would be explained by the significant increase during the last 5 years in the use of albendazole in commercial goat farms in the country.

Levamisole and pyrantel pamoate, however, proved highly effective against trichostrongyle nematodes in goats and in some farms, there was total removal of the worms. Levamisole is seldom used by Malaysian goat farmers and pyrantel pamoate, an expensive drug, had never previously been used on the farms tested. Thus the absence of resistance to these drugs was to be expected, and encourages their use as alternatives to unrelated anthelminthics which are no longer effective. Farmers should be educated on the use of alternating unrelated anthelminthics after a given period to avoid the generation of resistant strains of nematodes.

It is noteworthy that in farm No. 4, there appeared to be some resistance to pyrantel pamoate, but not to levamisole. About a third of the flock from this particular farm was previously acquired from neighbouring Thailand, and their previous anthelminthic history was unknown.

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ENQUETE SUR DES NEMATODES TRICHOSTRONGLES RESISTANT AUX MEDICAMENTS CHEZ LES CHEVRES DE DIX FERMES COMMERCIALES DANS L'OUEST DE LA MALAISIE

Résumé—La prévalence de parasites résistant aux médicaments chez des chèvres a rarement été rapportée en Malaisie. Une enquête a été réalisée sur les chèvres de dix élevages commerciaux pour déterminer la résistance aux anthelminthiques en mesurant la réduction du nombre d'oeufs dans les fèces après traitement avec du levamisole, du pamoate de pyrantel et du fenbendazole. Les animaux de la plupart des élevages ont montré une résistance au fenbendazole mais non au levamisole alors que ceux d'un élevage ont résisté à l'action du pamoate de pyrantel. Les raisons de ces observations sont discutées.

MONITOREO PARA RESISTENCIA A LOS ANTIHELMINTICOS DE NEMATODOS TRICHOESTRONGILOIDES EN GRANJAS COMERCIALES CAPRINAS EN MALASIA OCCIDENTAL

Resumen—Se ha informado pocas veces de la existencia de resistencia a los antihelmínticos en cabras en Malasia Occidental. Debido a esto, se monitorearon 10 granjas comerciales, midiendo la reducción en el conteo fecal de huevos después del tratamiento con levamisol, pamoato de pirantel y fenbendazol. La resistencia contra fenbendazol fue evidente en todas las granjas; no hubo evidencia de resistencia a levamisol, pero se encontró alguna resistencia a pamoato de pirantel en una de las granjas estudiadas. Se discuten el significado de estos hallazgos.

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