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**THE EFFICACY OF OXFENDAZOLE¹ IN THE THERAPY OF
EXPERIMENTAL HEAMONCHUS CONTORTUS INFECTION IN
GOATS IN SAUDI ARABIA**

BY

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INTRODUCTION

The prevalence of parasitic gastro-enteritis in farm animals exerts an economic impact of paramount significance particularly in tropical countries. Accordingly, a large number of anthelmintic chemotherapeutic agents became available in recent years for the veterinary profession. Oxfendazole (methyl [5-(phenylsulfinyl)-1-benzimidazole-2-yl] carbamate) has been introduced relatively recently as a broad spectrum anthelmintic and shown to be highly effective against many gastrointestinal roundworms, lungworms and tapeworms in several species of farm animals (Downey, 1976; Baker and Fisk, 1977; Chalmers, 1977; Downey, 1977; Baker et al., 1978; Chalmers, 1978; Duncan and Reid 1978; Michael et al., 1979 b). Very few reports, however, appear to be available in the literature on the evaluation of oxfendazole in the treatment of parasitic gastroenteritis in goats, camels and buffaloes (Michael et al., 1979 a and Michael et al., 1980).

¹ Systamex - The Wellcome Foundation Ltd., London, U.K.

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Goats and sheep appear to represent the largest numbers of livestock in Saudi Arabia (FAO-WHO-OIE, 1987). Abdel Razig and Parvez (1981) had reported a high incidence of parasitic gastroenteritis in several species of farm animals in the Eastern Province of Saudi Arabia. Therefore, the evaluation of new anthelmintic drugs under local conditions appeared feasible. In a previous communication, the authors reported the effective treatment of *Haemonchus contortus* infection in sheep with febantel² (Abdel Razig, Kawasmeh, Eltayeb, Ashour and Elsoufi, 1988). In continuation of the main theme, this paper presents the results of a clinical trial on the use of another anthelmintic (oxfendazole) for the treatment of *Haemonchus contortus* infection in goats in the same locality of Saudi Arabia.

MATERIALS AND METHODS

In this investigation *Haemonchus contortus* was chosen as a model for the purpose of experimental parasitic infection. Twenty young male goats ranging in age between 5-7 months purchased from the local market were used as experimental subjects. These animals were initially dosed with 2 grams of thiabendazole³ each in order to clear any previous parasitic infection. The animals were housed in partially-shaded pens and fed on lucerne and barley; and were allowed a liberal supply of fresh water.

Abomasal material was collected from sheep (or goats) slaughtered in the local abattoir. Mature female worms of *Haemonchus contortus* were collected and dissected for eggs. These were then concentrated by centrifugation and incubated at 30°C. Infective third stage larvae were reached in about one week and used for experimental infection. Larvae were retrieved using a Baerman apparatus. Suspended in physiological solution, the

2 Rintal - Bayer, Leverkusen, F.R. of Germany.

3 Thibenzole, Merck Sharp & Dhome,

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larvae were administered orally by stomach tube. Three different levels of parasitic infection were attempted in terms of the number of infective larvae administered (Table 1).

Faecal samples were then collected at variable intervals until at about one month later, all experimental animals were found positive for eggs of *Haemonchus contortus* indicating successful establishment of experimental parasitic infection in these animals.

Following this stage, the animals (divided into two groups) were dosed with oxfendazole at two different rates from a 2.265% suspension (equivalent to 22.65 mg/ml) approximately as follows:

- An average dose rate (equivalent to sheep) or 5.40 mg/kg bodyweight (Table 2).
- A relatively high dose of 16.20 mg/kg bodyweight equivalent to three times the average dose rate stated above (Table 3).

The calculated dose for each animal was delivered directly into the rumen by means of stomach tube.

Faecal samples were then collected and examined for eggs of *Haemonchus contortus* at 2, 7, 10 and 15 days after treatment with oxfendazole. Towards the end of this stage, 5 animals selected at random to represent the two groups above, were slaughtered for actual inspection of the abomasum for *Haemonchus contortus* and for general postmortem examination. Gross findings were noted and then some samples from the main organs (heart, lungs, kidneys, spleen, intestines and abomasum) were collected for histopathological examination.

Table 1. The Establishment of Experimental Parasitic Infection with *Haemonchus contortus* in Local Goats in Saudi Arabia

Animal No.	Number of larvae given	Number of eggs per gram of faeces (one month later)
31	500	2000
34	500	2800
36	500	2400
39	500	1700
40	500	1600
41	500	2200
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15	1000	4000
17	1000	3600
18	1000	5000
21	1000	3200
26	1000	3600
27	1000	5200
45	1000	4200
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3	2000	8000
5	2000	4000
6	2000	7200
10	2000	9600
12	2000	4600
14	2000	4600
43	2000	7800

----- Increase in the number of larvae administered.

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RESULTS

Experimental parasitic infection was successfully accomplished in all experimental subjects (Table 2). No eggs or larvae of any parasite other than *Haemonchus contortus* were seen in any of the experimental animals.

It can be seen in Table 2 that administration of oxfendazole at a dose rate of 5.4 mg/kg bodyweight in goats resulted the total disappearance of eggs of *Haemonchus contortus* from the faeces of experimental animals except one (No. 40). It is also noted that in most experimental subjects (80%) the faeces were found negative for parasites as from the second day after the administration of oxfendazole increasing to 90% by the 7th day and remaining so up to the 15th day when the clinical trial was concluded.

On the other hand; it can be seen in Table 3 that administration of oxfendazole in goats at a dose rate of 16.2 mg/kg bodyweight resulted total absence of eggs of *Haemonchus contortus* from the faeces of all the experimental animals in this group, thereby suggesting a 100% clearance. This finding was noted on the second day and was maintained up to the 15th day after treatment when the faecal collections were terminated.

Furthermore, clinical examination of all animals throughout the duration of this clinical trial revealed no clinical abnormalities at any stage. The animals appeared healthy and maintained a normal appetite and vigour.

When the 5 animals which were selected at random were slaughtered for postmortem examination, no trace of *Haemonchus contortus* could be detected in the abomasum of any of these animals. Furthermore inspection of various organs in the same animals revealed no gross pathological changes in any animal. Likewise,

Table 2. The Effect of Oxfendazole at 5.4 mg/kg bodyweight on Experimental *Haemonchus contortus* infection in Local Goats in Saudi Arabia

Animal No.	Weight in Kg.	No. of Eggs per gram of faeces before treatment	No. of eggs per gram of faeces after treatment (Days)			
			2	7	10	15
31	22	2000	0	0	0	0
36	18	2400	0	0	0	0
40	17.5	1600	200	0	200	100
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15	31	4000	0	0	0	0
12	24	4600	0	0	0	0
21	21	3200	0	0	0	0
26	13	3600	800	0	0	0
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10	17	9600	0	0	0	0
18	19	5000	0	0	0	0
43	21	7800	0	0	0	0

----- Increase in the level of parasitic infection.

Table 3. The Effect of Oxfendazole at 16.2 mg/kg bodyweight on Experimental *Haemonchus contortus* infection in Local Goats in Saudi Arabia

Animal No.	Weight in Kg.	No. of Eggs per gram of faeces before treatment	No. of eggs per gram of faeces after treatment (Days)			
			2	7	10	15
34	18	2800	0	0	0	0
39	21	1700	0	0	0	0
41	30.5	2200	0	0	0	0
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17	30	3600	0	0	0	0
5	19	4000	0	0	0	0
45	26	4200	0	0	0	0
<hr/>						
3	24	8000	0	0	0	0
27	22	5200	0	0	0	0
6	20	7200	0	0	0	0
14	24	4600	0	0	0	0

----- Increase in the level of parasitic infection.

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histopathological examination of sections from various organs yielded normal patterns at the cellular level in all organs.

DISCUSSION

The choice of *Haemonchus contortus* as a model for experimental parasitic infection in this clinical trial was based on the widespread occurrence of this parasite and related species in ruminant animals in this region. It appears reasonable to speculate that results obtained with *Hemonchus* can be expected to prove highly relevant to many other species of gastrointestinal roundworms affecting goats and sheep; from a general chemotherapeutic standpoint.

Because *Haemonchus contortus* was the only parasite detected in all the experimental animals, it is suggested that the animals were either naturally free of parasitism - or effectively cleared by the administration of thiabendazole - before experimental haemonchosis was established. The recent observations by Elbihari, Kawasmeh, Ashour and Elnaiem (1984) support the efficacy of thiabendazole for this purpose in the same locality.

The potency of oxfendazole in clearing *Haemonchus contortus* infection in goats is well illustrated in the results of this investigation both by faecal examination and postmortem abomasal inspection. It is noteworthy that at a dose rate of 5.4 mg of oxfendazole/kg bodyweight, 90% of the experimental animals were found negative for eggs of *Haemonchus contortus* - indicating successful treatment. This situation is fairly comparable to findings by other workers in sheep and in goats (Averkin, Beard, Dvorak, Edwards, Kilian, Schiltz, Kistner, Drudge, Lyons, Sharp and Crown (1975); Michael, Higgins and Refaii (1979)).

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The dose rate of 5.4 mg oxfendazole/kg bodyweight adopted in this investigation for treatment of goats represents an average dose rate extracted from the fairly wide range of dose rates recommended by the manufacturers for the treatment of sheep; and calculated here only hypothetically to serve as an average dose rate possibly useful for the treatment of goats in routine veterinary medical practice. It will be noted, however, that this dose rate is slightly higher than that recommended by the manufacturers for cattle (4.5 mg/kg bodyweight).

The exploratory high dose rate of 16.2 mg/kg bodyweight which resulted a 100% response within 2 days implies that if necessary (such as in exceptionally heavy parasitic infestations) some increase in the usual dose rate of oxfendazole may be considered safe by clinicians. This is supported by noting that in this investigation no adverse or toxic signs of any nature were noted in any animal either clinically or by histopathological studies up to 3-fold the usual dose - an increase which is unlikely to be exceeded for usual therapeutic purposes.

The findings reported in this communication indicate that amongst the relatively recent anthelmintics, oxfendazole appears to be both effective and safe for use in goats under local conditions in Saudi Arabia.

SUMMARY

The efficacy of oxfendazole for the treatment of experimental haemonchosis in local goats in Saudi Arabia was studied. At an average dose rate of 5.4 mg/kg bodyweight, this chemotherapeutic agent resulted total clearance of eggs of *Haemonchus contortus* from 90% of the experimental animals. No adverse or toxic effects of any nature could be demonstrated by clinical or histopathological studies up to a high dose rate of

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16.2 mg/kg bodyweight. The results indicate that oxfendazole - a relatively recent anthelmintic - is suitable for use in goats under local conditions in Saudi Arabia.

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