

**THE EFFICIENCY OF DIAMPHENETHIDE  
AGAINST *FASCIOLA HEPATICA*  
IN SHEEP (\*)**

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*Summary*

Twelve lambs, experimentally infected with *Fasciola hepatica* metacercariae, were treated with diamphenethide at 120 mg/kg. At this dose rate anthelmintic efficiency was 100% against two, four and six-week-old *F. hepatica*. The drug was also found to be 94.5% effective against eight-week-old and 91.3% against ten-week-old flukes. A further 20 naturally infected lambs were also treated with diamphenethide at 120 mg/kg. Fluke egg output was arrested in 83.3% of the treated group following a single dose.

INTRODUCTION

Fascioliasis is recorded in almost all parts of Iran, the annual damage caused by the disease being estimated as equivalent to a loss of millions of dollars.

At the present time the drugs available for use against this disease are Tetra-razo (carbon tetrachloride) and Bilevon M (niclofolan: 5,5'-dichloro-2,2' dihydroxy-3,3'- dinitro-biphenyl). Although double the normal dose levels are recommended during outbreaks of acute fascioliasis, deaths are still recorded.

Dickerson, Harfenist & Kingsbury (1971) demonstrated that a new compound diamphenethide (Coriban; Wellcome Foundation Ltd.),  $\beta,\beta$ -bis-(4-acetamidophenyl) ethyl ether, had high efficiency against the liver tissue stages of *Fasciola hepatica*. Subsequent work has supported this initial report (Armour & Corba, 1972; Edwards & Parry, 1972a and b; Kingsbury & Rowlands, 1972; Kendall & Parfitt, 1972 and 1973; Annen, Boray & Eckert, 1973; Corba, Hovorka & Popovic, 1973; Ueno & Morales, 1973; Balasubramaniam, Anandan

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& Alwar, 1974; Rowlands, 1974). In view of these findings anthelmintic efficiency trials with diamphenethide against experimental and natural-infestations with *F. hepatica* in sheep were performed at the Razi Institute, Tehran.

## MATERIALS, METHODS AND RESULTS

### Experiment 1

Metacercariae for use in this experiment were obtained from laboratory cultures of *Lymnaea truncatula* collected from Karaj, 50 km west of Tehran, which had been maintained on *Oscillatoria obscura* algal cultures. The cercariae shed from these snails were collected on gelatin sheets and stored in the refrigerator.

Twelve, five-month-old shal cross lambs having an average weight of 16.5kg were used in this experiment. These animals had been housed for the previous three months and fed on dry alfalfa.

Each lamb was infected with 150 *F. hepatica* metacercariae on gelatin, administered by capsule. The 12 animals were then divided into six equal groups. Treatment with diamphenethide was administered at the dose rate of 120 mg/kg to lambs in five of the groups at two, four, six, eight and ten weeks after infection respectively. The sixth group was kept untreated as control.

All the lambs were clinically examined daily from the time of treatment until slaughter at 12 weeks after infection. At post-mortem examination the livers were examined and dissected and the results are recorded in Table 1.

TABLE I  
RESULTS OF TREATING SHEEP WITH DIAMPHENETHIDE AT 120 mg/kg AGAINST EXPERIMENTAL INFESTATIONS OF *F. HEPATICA* AGED 2, 4, 6, 8 AND 10 WEEKS

Group	Eartag	Treatment given after	No. of flukes recovered from each lamb	Efficiency of treatment	Mean efficiency
1	2455	2 weeks	0	100%	100%
	2863		0	100%	
2	2429	4 weeks	0	100%	100%
	2827		0	100%	
3	609	6 weeks	0	100%	100%
	2468		0	100%	
4	2425	8 weeks	4	93.7%	94.5%
	2872		3	95.3%	
5	2873	10 weeks	6	90.5%	91.3%
	2874		5	92.1%	
6*	20	Control	65		
	2426		62		

\* Recovered from control animals a mean number of 63.5 flukes. This represents an overall 'take' of 42%.

## Experiment 2

A flock of 200 Kurdish bred lambs, naturally infected with *F. hepatica*, were obtained from Kermanshah, West Iran. Eight lambs died in transit within four days; postmortem examinations showed that death had been due to an acute fascioliasis (*F. hepatica* and *F. gigantica*). Twenty-two lambs were selected from the flock for experimental use; 20 were treated with diamphenethide at the rate of 120 mg/kg and two were kept as untreated controls. The control animals and two of the treated lambs died within a week of treatment. Post-mortem examinations revealed that the controls had died of an acute fascioliasis and that the two treated animals had succumbed to serious liver lesions. Routine faecal examinations were performed throughout the trial period. At the beginning of treatment all lambs were passing fluke eggs whereas by 20 days later only three lambs had fluke eggs in their faeces, suggesting a group efficiency, in terms of fluke egg output, of 83.3%.

## DISCUSSION

The results obtained in Experiment 1 confirm the very high degree of efficacy achieved by diamphenethide against the pre-bile duct stages of *Fasciola hepatica*. The drug exhibited an efficiency of 100% against two, four and six-week-old flukes at the dose rate of 120 mg/kg. Efficiency against older flukes was found to be 94.5% and 91.3% at eight and ten-week-old stages, respectively.

As the flock used in Experiment 2 had been gradually infected, the flukes recovered from the livers were found to be of different ages. The death of the two treated lambs was most probably due to the irreparable damage which had been inflicted prior to treatment, as indicated by the serious liver lesions observed in both cases. The failure to demonstrate the presence of fluke eggs in faeces samples taken some three weeks after dosing from 15 of the remaining 18 treated lambs suggests that in this respect the treatment had achieved an efficacy of 83.3%. The comparative inefficiency of the drug in the other three lambs would probably be explained by the fact that at least some of the parasites would have been more than eight weeks of age at the time of treatment.

The results obtained in Experiment 2 show that diamphenethide could be used for strategic treatments. No drug toxicity was observed in the treated animals in either the field or laboratory investigations.

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