

Treatment against Lungworms (*Dictyocaulus filaria*) in Sheep.

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THE lungworm *Dictyocaulus filaria* is fairly widely distributed in the grassveld regions of the Union. It is only in a few small centres, however, that its presence is obvious, on account of the effects it produces. These are areas in which moist pastures favour the spread of infection. In the other parts the lungworms are usually not noticed at all, because they occur in very small numbers and do no damage, but their presence becomes noticeable during and after a wet season, such as occurred in the summer of 1938-39. In this year lungworms were seen to occur and to do damage even in the Transvaal Highveld, e.g., in the vicinity of Amersfoort, Volksrust and Wakkerstroom. It is very probable that a few summers with more normal rainfall will cause the worms to disappear again, or rather to recede into the background, in such areas.

On the whole, therefore, this lungworm is not a cause of serious trouble in the Union and, besides, it is known that if infected sheep are well fed and protected from adverse weather conditions most of them soon recover. The infective larvae are not resistant to desiccation and infection can therefore be avoided by keeping sheep from moist pastures. However, if a satisfactory method of treatment were available it would be useful, either to prevent losses where an infection flares up, or as a means of exterminating the parasites altogether.

Many methods of treatment have been described, but most of the older methods were discarded as useless. Only the method of intratracheal injection has still several supporters. It was particularly Orloff (1935) who, in recent years, aroused new interest in this method by stating that, since the worms were almost exclusively located in the posterior, dorsal parts of the lungs, the sheep has to be placed on its back, head upwards, in a trough-like receptacle which stands at an angle of 45° to the horizontal, so that the injected fluid would flow into the affected parts of the lungs. After the injection the sheep is kept in a sitting position for 20-30 seconds. He claimed very good results from two injections, on two successive days, of 10 c.c. of the following mixture: 1 c.c. 10 per cent. tincture of iodine, 50 c.c. glycerine and 150 c.c. distilled water.

Subsequently other Russian authors confirmed these results, but there appeared to be a general preference for one injection of 15 c.c. of a mixture of iodine 1 part, potassium iodide 2 parts, water 1,500 parts.

In France Velu and Zottner (1937) used pyrethrin, giving three 10 c.c. doses of an aqueous solution containing 1 mgm. pyrethrin per dose. In this case the drug is administered through the nose, by means of a rubber tube measuring 12-15 cm. by 4.5 mm., the sheep being kept in a sitting position and thereafter on its back for a few seconds. Good results were also claimed for this method.

Some 12 years ago the writer tested various intratracheal injections and also gave a number of drugs *per os*, but none of them had any effect. Recently further tests have been made and it is intended to report on these now.

The tests were made on a farm in the Transvaal highveld, on a flock of sheep in which serious losses were occurring. The method used was that of Orloff. The needle was directed backwards in the trachea and each sheep was rolled over first to one side and then to the other, while the successive halves of the dose were being slowly injected so that each lung should get its portion.

The first test was made on 4.5.39. From a flock of affected animals 30 were selected which were coughing and in poor condition. About a teaspoonful of faeces was collected from each of them and placed in gauze, which was then suspended in a specimen tube containing about 20 c.c. lukewarm water. After two hours the gauze and faeces were discarded, about 2 c.c. concentrated formalin was added to the water and the specimens later examined at the laboratory.

The sheep were then treated as follows:—

- No. 1. 16 sheep. 15 c.c.: Iodine 1, Potassium iodide 2, water 1,500.
- No. 2. 10 sheep. 10 c.c.: Tincture iodine 1, Glycerin 50, water 150.
- No. 3. 4 sheep. 10 c.c.: Tetrachlorethylene emulsion containing 0.5 c.c. C_2Cl_4 .

In the case of No. 2 a second dose was administered by the owner on the following day. The tetrachlorethylene, No. 3 group, produced marked distress and one of the sheep died within a few minutes after having received the injection.

The rest of the flock, 150 sheep, were all given the same injection as No. 1 group of the test sheep, but their faeces were not examined. However, they also received a distinguishing mark.

On 19.5.39, i.e., 14 days after treatment, the owner prepared faeces samples from the test sheep which were still alive at that time, in the same way as had been done before treatment, and forwarded them for examination. He also wrote that a number of the treated sheep had died and he had found lungworms in all. The remaining sheep had not improved in condition.

The prepared faeces samples were examined by sucking up material from the bottom of the tube by means of a pipette and examining this under the microscope. In negative cases several such samples were examined. The findings were as follows:—

	<i>Positive 4.5.39.</i>	<i>Positive 19.5.39.</i>
Group I	12 of 13	3 of 8
Group II	9 of 9	3 of 6
Group III	2 of 2	0 of 1

The number of specimens examined is smaller than the number of sheep because a few specimens were broken in transit to the laboratory.

These results do not appear to be quite dependable, because when the second test was made on 30.6.38 eight infected sheep of Group I and four infected sheep of Group II were found.

It may be that the treatment stopped egg-production for a time while the worms were not killed.

The second test, 30.6.39, was made with the assistance of the Government Veterinary Officer of Ermelo, Mr. M. de Lange, who gave the second injections and finally made the post-mortem examinations. I wish to express my appreciation of his willing collaboration in this matter.

For this test 20 sheep were selected by faeces examination, as in the first test, except that the specimens were examined fresh, on the farm. Group I was injected with the mixture Iodine 1, Potassium iodide 2, Water 1,500; dose 15 c.c. Group II was injected with a proprietary concentrated pyrethrin preparation "Pyeffy" 1.25 c.c., olive oil 250 c.c.; dose 10 c.c.

The first injection was given on 30.6.39 and half of the sheep of each group received a second injection 13 days later. On 1.8.39, i.e., 19 days after the second injection the sheep then still living were killed. The results are given in the following table:—

Sheep No.	Infection 30/6/38.	Treated (Group) 30/6/38.	Treated (Group) 13/7/39.	Infection 1/8/39.
2	xxxx	I	I	xxxx
4	x	I	I	0
7	xxx	I	I	xx
10	xxxx	I	I	xx
12	x	I	I	xx
16	xxx	I	—	x
22	xxxx	I	—	0 (2/7/39)
23	xx	I	—	0
5	xxx	I	—	x (23/7/39)
11	xx	I	—	x (10/7/39)
1	xx	II	II	0 (20/7/39)
14	x	II	II	xx
18	xxx	II	II	xxx
19	xx	II	II	xxx
20	xx	II	—	0 (2/7/39)
15	xx	II	—	x (10/7/39)
21	x	II	—	xxx
24	xx	II	—	0
30	xx	II	—	xxxx
32	x	II	—	x (25/7/39)

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Remarks. Infection 30.6.38.—The grade of infection, estimated according to the number of larvae found on examination, was arbitrarily indicated as x to xxxx.

Infection 1.8.39.—The grade of infection found at post-mortem was indicated as follows:—

- x: 1- 10 worms present.
- xx: 10- 50 worms present.
- xxx: 50-150 worms present.
- xxxx: over 150 worms present.

In those cases in which a date is given after the grade of infection the sheep had died on those dates and had been examined by the owner. He merely noted whether worms were present or not and a x in such a case therefore gives no indication of the grade of infection.

The results of this test can be summarised as follows:—

- Group I One treatment : 3 of 5 still infected.
- Group I Two treatments: 4 of 5 still infected.
- Group II One treatment : 4 of 5 still infected.
- Group II Two treatments: 3 of 5 still infected.

The results of these tests are not very promising. On the whole it would not appear as if intratracheal injections could be very effective, on account of the fact that the worms are located in the smaller bronchi, in which they lie in a mass of fairly thick mucus. Unless a very specific drug can be found and this can be injected in a vehicle which will mix with the mucus and so penetrate to the worms, this method of treatment seems bound to fail. In cases of very light infection the intratracheal injection may possibly be satisfactory, but such cases hardly need to be treated, unless this is done to prevent further infection of pastures.

SUMMARY.

Intratracheal injections of iodine and pyrethrin mixtures against *Dictyocaulus filaria* in sheep, administered as described by Orloff, were not successful in removing the parasites. It would appear, however, as if such iodine injections may stop egg-laying for a number of days and in this way led to false conclusions.

REFERENCES.

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