

Phenothiazine  
*for*  
Control of Stomach Worms  
in Sheep

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# Phenothiazine for Control of Stomach Worms in Sheep

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The common stomach worm (*Haemonchus contortus*) is the most devastating parasite found in farm flocks of sheep in this region, and is generally recognized to be a problem wherever sheep are kept under confined conditions. Yet this widespread parasite is so easily controlled that much of the trouble resulting from it is unjustified. Treatment cuts down the feed bill and allows the lambs to gain. The small investment in time and money will return big dividends.

Stomach worms can be controlled by use of phenothiazine, obtainable in some drug stores and at most livestock supply houses. This drug is also effective against most of the other internal parasites of sheep, except tape worms. Fortunately, Oklahoma is troubled very little with tape worms in sheep.

Phenothiazine is especially recommended by the United States Bureau of Animal Industry for control of nodular worms, which is necessary at present as a wartime measure. Sheep intestines are the chief source of surgical sutures, and nodular worm infestation makes them unfit for this purpose. Nodular worms also ruin the intestines for production of sausage casings, another of their principal uses.

Since stomach worms are more common than nodular worms in Oklahoma farm flocks, tests were made recently at the Oklahoma Agricultural Experiment Station to determine the most effective way of giving phenothiazine to control stomach worms. It was assumed that whatever method best controlled stomach worms would also control nodular worms, since the latter are farther down the intestinal tract.

Seven common methods of administering phenothiazine were tried. All seven proved very effective, the efficiency ranging from 99.7 to 100 percent. For all practical purposes, one method was as good as another for giving routine treatments for prevention of stomach worms. (For treating sheep already seriously injured by stomach worm infestation, this might not be true.)

The old standby for stomach worms, copper sulphate, was also tested and removed 98.8 percent of the stomach worms.

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## Methods Tested

The seven methods of administering phenothiazine tried in these tests were:

1. A commercial suspension of phenothiazine given slowly from a dose syringe after the lamb has been given a taste of one percent solution of copper sulphate (bluestone). The copper sulphate closes the esophageal groove so that the drug goes directly into the true stomach.

2. A commercial suspension of phenothiazine given slowly without previous treatment.

3. Phenothiazine powder mixed with an equal weight of blackstrap molasses, water added, and the suspension given by means of a dose syringe.

4. Phenothiazine powder mixed with an equal weight of blackstrap molasses and added to grain.

5. A commercial suspension of phenothiazine given by the "Texas" method, using a syringe with a 6-inch nozzle. The nozzle is placed far back in the throat of the sheep while the free hand is used to stop breathing by grasping the animal's nose. The drug is given instantaneously with a quick thrust of the plunger.

6. A commercial suspension of phenothiazine given by the "Texas" or "quick" method following a taste of copper sulphate solution.

7. Phenothiazine given in the form of a commercial pellet.

## How Tests Were Made

Veterinarians have known for years that when sheep are drenched the medicine may go into either the paunch (rumen) or the true stomach (abomasum). Some drugs will go one place and others to the other. In finding the best way to administer phenothiazine so as to be most efficient in control of stomach worms, it was first necessary to do some preliminary work to find out to which of the sheep's "stomachs" this drug goes. In this preliminary experimental work, phenothiazine was given lambs by four different methods just prior to slaughter and the stomach contents examined to find where the drug went.

Two lambs were each given two ounces of a commercial phenothiazine suspension slowly from a syringe after the lambs had received a taste ( $\frac{1}{2}$  oz.) of 1 percent copper sulphate solu-

tion. The copper sulphate solution apparently closed the esophageal groove because all the material was found in the true or fourth stomach (abomasum).

Two more lambs had the phenothiazine suspension administered in the same manner except that nothing was previously given the lambs. In these lambs approximately 90 percent of the drug was found in the paunch (rumen) and the remainder in the pouch stomach (reticulum).

Two lambs were treated by the "Texas" method so commonly employed on the ranges of that state. These lambs, of course, had no chance to swallow; and all the phenothiazine was recovered in the rumen.

The two remaining lambs were given a taste of copper sulphate and then the phenothiazine by the "Texas" method. The results were about the same as when it had been given slowly (the lambs swallowing) without the taste of copper sulphate; that is, about 90 percent of the drug was found in the paunch.

After the preliminary work was finished, 36 head of heavily parasitized lambs were secured from two local farms on October 30, 1942. Eighteen of these lambs had been drenched once in mid-July with a solution of copper sulphate and steeped snuff. The other 18 lambs came from a flock that had been drenched four times during the grazing season. The first two treatments were with a drench of copper sulphate and nicotine sulphate (Black Leaf 40). The last two treatments were with a commercial drench of tetrachlorethylene suspended in oil, a product commonly sold and used in the Southwest. The first of these tetrachlorethylene treatments had been given at six weeks, and the last treatment two weeks, prior to purchase of the lambs for use in these tests.

Microscopic examination of the individual droppings showed all the lambs to be heavily infested with stomach worms, but had few other internal parasites. The degree of infestation found by this inspection, the origin of the lambs, and the weight of the lambs were used in dividing them into nine uniform groups of four each. The treatments shown in Table I were administered on November 5, 1942; and all the lambs were fed together on oats, corn, and alfalfa hay after treatment.

The lambs that were treated with the 1 percent copper sulphate solution were kept off feed and water for sixteen hours before and six hours after treatment.

The phenothiazine administered in feed was added to a mixture of grain and rolled oats. A light sprinkling of dry rolled oats was placed on top of the mixture as bait. The lambs ate the bait readily, but stopped eating after nibbling some at the mixture. They were fed no other feed and it was approximately twenty-four hours before they cleaned up the medicated feed.

The lambs were slaughtered November 17, 1942, and the number of stomach worms in each true stomach carefully counted.

### Results of the Tests

The average weight gains and the number of worms found in the stomachs of each lot of lambs are shown in Table I.

*Table I.—Effectiveness of Different Treatments in Removing Stomach Worms (Haemonchus Contortus) from Lambs.*

Lot No.	No. of Lambs	Treatment <sup>1</sup>	Average Initial Weight	Average Final Weight	Total No. Stomach Worms Recovered From Lot
1	3 <sup>2</sup>	Phenothiazine slow after ½ oz. copper sulphate	54.0	59.7	9
2	4	Phenothiazine slow	53.2	58.5	24
3	4	Phenothiazine in molasses, drench	56.0	59.7	0
4	4	Phenothiazine in feed	54.7	60.2	5
5	4	Phenothiazine—fast or "Texas Method"	56.2	61.2	17
6	4	Phenothiazine fast after ½ oz. copper sulphate	56.2	57.7	1
7	4	Phenothiazine in commercial pellet	57.2	61.0	12
8	4	2½ oz. of 1 percent copper sulphate solution	57.2	62.2	97 <sup>3</sup>
9	4	Check—No treatment	53.2	53.7	7792

<sup>1</sup> All lambs receiving phenothiazine were given 13.5 gm each.

<sup>2</sup> Four lambs were originally designated for this lot, but one lamb was left untreated and had 1,886 stomach worms at slaughter.

<sup>3</sup> One fringed tape worm.

All lambs except the untreated ones made substantial gains. There was, of course, considerable fill represented in these gains. It is doubtful if there is a worthwhile difference in the gains made by the treated lots, but they all did make a substantially greater gain than the untreated lambs.

The commercial mixture of tetrachlorethylene in oil given prior to the tests was apparently not effective. The two untreated lambs from the flock that had used this mixture twice in the preceding six weeks showed a heavy infestation, and one of these lambs carried 2,315 stomach worms. The flock from which these lambs came showed as many worm eggs from these lambs as from the other flock that served as a source of experimental lambs.

Phenothiazine, regardless of the manner of treatment, proved very effective in removing the stomach worms. The efficiency ranged from 99.7 to 100 percent, and for all practical purposes one method was as good as another. Copper sulphate, removed approximately 98.8 percent of the stomach worms.

A few of these lambs had a very few nodules when slaughtered, but most of the lambs were clean. These experimental lambs, while heavily parasitized, were quite typical of lambs carried through the summer in Oklahoma. They had a heavy infestation of stomach worms, but few other internal parasites.

### Application of Results

Phenothiazine is considerably more expensive than the standard drench of copper sulphate and nicotine sulphate (Black Leaf 40) or the copper sulphate and steeped tobacco drench. Because of this difference in cost, it is probably not desirable to treat more than twice a year with phenothiazine. For routine control, drench once a month with the standard drench. As noted above, the copper sulphate treatment was 98.8 percent effective.

If phenothiazine is used twice a year, as a means of controlling nodular worms as well as stomach worms, it probably would be best to use it once in the early spring and again in the fall after the first freeze. Experiments conducted by the United States Department of Agriculture have shown that survival of nodular worms over winter is very low. Stomach worms, on the other hand, survive well in a normal Oklahoma winter.

Complete removal of stomach worms will not prevent re-infestation if the sheep are on an infested pasture. The life cycle of the stomach worm is such that a sheep can become re-infested every 30 days.

One need not become alarmed when the urine of sheep turns red a few hours after the use of phenothiazine. This drug turns to a dye in the body of the sheep. Keeping the sheep on pasture or in a well bedded pen will prevent the wool from becoming stained by the red urine.

The tests reported here did not involve the question of treating sheep already seriously ill from stomach worm infestation. It is probable that the method of administration might be significant in such cases. But for routine stomach worm control, the method used appears to make little difference in the effectiveness of the treatment.