
CLINICAL MEDICINE

Complications of Hypodermiosis

Veterinary practitioners and most livestock owners are aware of hypodermiosis* and some of its consequences. These include hide damage due to the breathing holes cut in the skin, loin meat loss because of trimming away of the encysted larvae, and the annoyance caused by the flies attacking the cattle causing them to run wildly with their tails arched characteristically over their backs. Cattle will stand in groups, or try to rid themselves of the flies by standing in ponds. Interference with grazing and the wild running by the cattle are responsible for decreased milk production and lowered weight gains.

Another syndrome of hypodermiosis was seen in the clinic. Many people are not aware of this syndrome and it is for this reason this report is being printed.

On January 2, 1962, a yearling Hereford heifer was admitted to the clinic showing asthenia and incoordination in the hind legs. The anamnesis was as follows:

Two lots of cattle were being fed on a northwest Iowa farm. One lot contained 206 head; the other lot had 176 head. On December 2, 1961, both lots were started on treatment with a systemic insecticide, ronnel.† Treatment consisted of mixing the ronnel with ground corn and mineral supplement in a commercial mixer to assure an equal concentration of the insecticide with the ground corn vehicle. Both lots were fed 18 lbs. corn, all the silage they would eat, but no hay, plus 2 lbs. of 35% protein supplement. The insecticide-mineral-ground corn mixture was to be top dressed over the feed daily for 14 days. On

the eleventh day of treatment 22 head from the lot of 206 had marked difficulty in rising with symptoms of incoordination of the hind limbs and muscular weakness. Two were unable to stand. The systemic insecticide treatment was withheld from the feed. In 24 hours, twenty of the 22 could rise without difficulty and had apparently recovered. The two with the more pronounced paresis made slight improvement, but were unable to stand without assistance and were incoordinated in the posterior limbs. After 21 days had elapsed and no further improvement was evident, one heifer was brought to the Iowa State University Veterinary Clinic for observation and diagnosis.

A tentative diagnosis was made by Dr. Fred Neal, based upon the history and symptoms that were observed. This diagnosis was larval invasion of the spinal cord which was substantiated by post mortem inspection.

Before going into the necropsy findings, it would be well to review the life cycle of the *Hypoderma* species to fully appreciate this case.

The eggs of both *Hypoderma lineatum* and *Hypoderma bovis* are attached to the hair. Those of *H. lineatum* are attached in rows along the hair shaft, while *H. bovis* deposit single eggs. The larvae usually emerge from the eggs within one week and penetrate the intact skin. The larvae of *H. lineatum* migrate to the abdominal cavity, the thoracic cavity and to the esophagus. They require about 2½ months to reach the esophagus, where they remain approximately another 2½ months. This is often a cause of esophagitis and marked edema of this structure. The larvae then work upward through the back coming to

* Synonyms are "wolves," "cattle grubs," "grubs," "bomb flies," "heel flies," and "warbles."

† Dow Chemical Company, Midland, Michigan.

rest under the skin in the region of the back and loins. Another month is needed for the later migration. Breathing holes are then cut through the skin. After oxygen is obtained, size increases rapidly, and about 1½ to 3 months later the larvae emerge, drop out and pupate on the ground. The length of the pupal stage depends on the climatic conditions and environments. From this pupal stage the adults emerge, mate, and lay eggs. They never feed and generally die before traveling more than a few miles (3). This may explain why one lot had 22 affected animals, while the other lot had none. These two lots were pastured about 10 miles apart in the summer of 1961.

Haberman et al. (1) found that only *H. bovis* were regularly found in the spinal canal. *H. lineatum* were rarely found there. He reported 982 larvae removed from spinal canals, and of these 975 were *H. bovis*. Only 7 were *H. lineatum*, or less than one per cent. The reverse ratio was true in the esophagus. Here 99 per cent were *H. lineatum*. This indicates that most of the CNS disturbances would be caused by *H. bovis*, the northern heel fly, but that both species can be found and incriminated when CNS symptoms are portrayed.

Post Mortem Findings

On January 11, 1962, the heifer was sacrificed at the ISU meat laboratory. The carcass was handled somewhat differently than the routine slaughter in that the carcass was not split sagittally through the spinal cord and canal. The para-sagittal cuts were made 1½ inches to each side of the spinal canal and the intact spinal cord, canal, and brain were taken to the post mortem room. The findings were as follows: subdural hemorrhage of the brain and anterior cervical cord due to captive bolt euthanasia.* The spinal cord appeared normal except in the lumbar area where one intact larva was found in the spinal canal along with three or four degenerating larvae, one of which was closely adherent to the cord itself. A small amount of pinkish-colored fluid was found in the area.

The larvae were examined and found to

be in their second larval stage. The species was not identified. In histological sections, the disintegrating larvae were seen on the meninges. A pachymeningitis was confirmed by thickening of the dura and the presence of many eosinophils in the dura mater and cord tissue immediately beneath it. In sections through the larvae and cord, the eosinophils were more numerous about the larvae than elsewhere in the spinal cord.

From the positive findings in post mortem examination, the tentative diagnosis was affirmed.

As an added interest it might be stated that earlier this winter a *Hypoderma bovis* larva was found in the cochlea which caused the animal to have central nervous symptoms similar to those associated with listeriosis. The animal was depressed, lethargic, and carried the head in a lowered, outstretched manner, tilted to one side with a disturbance of equilibrium. It is probable that many nervous disorders caused by larvae are not recognized because of incomplete post mortem examinations of the nervous system.

This article is not intended to discourage the use of the oral systemic insecticides. Certainly everyone should read the directions and follow them precisely. One manufacturer recommends their product should not be administered in our area after December 1, while other authorities recommend the treatment should be finished by November 1. The reason for early use is to kill the larvae before they have migrated to the area about the spinal canal.

The causes of this particular syndrome are unknown. Several theories should be considered:^{2 3}

1. the insecticide causes hypermobility of the larvae in the meninges and thus causes spinal cord injury with paresis or paralysis;
2. the insecticide kills the larvae, and their physical presence puts pressure on the spinal cord in the lumbar area;

*Captive bolt euthanasia is done with a pistol having a sliding cylinder which renders the animal completely insensitive instantly. The pistol is held against the head, and the sliding bolt enters the brain.

3. toxins produced and liberated by the disintegrating larvae affect the nerves leaving the spinal cord in the lumbar area.

REFERENCES

1. Haberman, W. O., Morgan, B. B., and Dickie, R. J. The Occurrence of Hypoderma Larvae in the Spinal Canal of Cattle. J. Agric. Res. 78 (1949) 637-640.
2. Neal, Dr Fred. Clinician ISU Veterinray College. Personal Communication.
3. Stockdale, H. J. ISU Extension Entomologist. Personal Communication.

Glen Sutter '63

Torsion of the Liver of a Sow

On January 20, 1962, a dead sow was brought to the Iowa Veterinary Diagnostic Laboratory, Ames, Iowa for a necropsy. The sow came from a farm where two other sows had farrowed and subsequently became sick. The dead sow had farrowed on January 9. She was off feed and acting lethargic on the evening of January 29.

She was found dead on the morning of January 30.

The necropsy disclosed a torsion of the right lobe of the liver with apparent passive hyperemia of the lobe. Several ruptures had occurred in the affected lobe. Also peritonitis was evident.



The accompanying picture shows most of the ruptures. The affected lobe is darker in contrast to the normal lobe. The affected lobe was roughened and had fibrous tags due to the peritonitis.

John E. Flint '63

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