Parasites of Foxes  
(Continued from August issue)

LUNGWORMS  
Many years ago, when the fox breeding industry found itself in its infancy, lungworms belonged to the most virulent group of parasites a fur ranch could harbor. Although lungworms can now be found in most parts of the continent, their incidence is lessened since the fur rancher has learned how to interrupt the life cycle of the parasite. Moreover, with generations upon generations of foxes produced in the last fifteen years in confinement, these animals have acquired some degree of immunity to lungworms. A fox born should be with the young which need a certain time to build up and strengthen any tendencies of immunity given to them by their mothers. The young which are malicious and ridden to the ravages of lungworm disease should be brought up in unsanitary environment and come in contact with ova-infected vegetation. Many an adult is potentially dangerous to its pups in that respect because it may carry these worms but show few or no symptoms. The soil in such pens will be continuously seeded with ova, which soon become infective and when swallowed by a pup will have initiated a new victim of lungworm disease.

It is erroneous to assume that the Rocky Mountain region is free of these parasites. Autopsies of several hundred adult fox carcasses during last year's pelting season revealed that over six per cent of them harbored lungworms. The animals did not show the typical symptoms expected when lungworm infestation is present, and still these parasites were found in the bronchial tubules. The adults exhibited were strong enough to keep these parasites down to a minimum. On the other hand, pups are highly susceptible and soon become unthrifty and poor in condition. A rattling, wheezing respiration, interrupted by a hacking cough, is characteristic of the presence of lungworms. Such abnormal respiratory sounds may often be heard without a stethoscope. These symptoms become aggravated, if not healed, when excited. The result will vary from a mild bronchitis to pneumonia, the latter usually being fatal.

The two species of lungworms are recognized in foxes, namely, *Eucoloeus Aerophilus* and *Crenosoma Decortorum* (Vulpis). The mature female lays eggs capable of being coughed up through the windpipe and usually swallowed and later deposited in the soil with the feces. There the ova will hatch out in a short time. Shaded, damp soil of clay or heavy loam is particularly favorable to the development of the ova into their infective form. Weeds and other vegetation in pens also favor development. While the lungworm ovum possesses a shell equally as thin as that of the hookworm, it is remarkably resistant to adverse weather conditions as long as moisture is present. It is not killed by frost and may remain unchanged and infective in the soil for long periods. When the embryonated ova are ingested the emerging larvae quickly penetrate into lymph spaces of the gut wall and are thus carried to the general circulation. After considerable migration they arrive in the blood vessels surrounding the lung alveoli, and pass through their walls into the air spaces. Hemorrhage and tissue destruction may be the result. While development of the young worms to maturity continues, they migrate gradually into the larger air passages of the lung and soon begin to mate and reproduce anew.

Simple, uncomplicated lungworm infestation rarely causes death. Occasionally an animal may be asphyxiated because a large number of worms mixed with accumulated mucus results in obstruction of the trachea. In pups we often find pneumonia to be a fatal sequel to lungworm infection. Many small wounds in the lining of the lung caused by migrating larvae, and chronic, local irritation to these delicate tissues serve as portals of entry for bacteria which cause inflammation of the lungs.

A number of complications may result from lungworm infestation in adult foxes when there is a history of apparent recovery from an earlier infestation. It is advisable not to retain such an adult for breeding purposes even if no symptoms are present. It is possible that undesirable bacterial organisms have been admitted into the general circulation via the multiple small lesions caused by migrating lungworm larvae, a number of infective foot may be established in various parts of the body and outside of the lungs. These may lodge in the brain, cornea of the eye, villi of the intestines, testes of the male, placenta of the pregnant female, etc.

There is no treatment known to combat lungworm infestation. When foxes are infested with these parasites they are usually inconsiderable enough to constitute a problem. The worm is attached by its so-called head to the lining of the small intestines by means of hooks and suckers, while the segmented body, which may attain a length of several feet, lies in the gut and produces no symptoms. Here it absorbs large quantities of liquefied food material which is normally intended for the fox. It is clear that such infected animals will be of little market value and will still remain thin. Their furs will be considerably inferior in quality, and breeding ability considerably delayed.

The parasite sheds periodically its last segments with the feces. These contain ova in large numbers, are motile and quite visible to the casual observer. It is not difficult to detect them. It is possible to obtain ova from crushed segments of the feces of foxes that are infested and they may be identified as to their species. Since all tapeworms require at least one intermediate host in the course of their life cycle, the parasites are quite specific as to the species of the worms. It is necessary to examine segments as well as ova to determine the intermediate host. For instance, fleas are carriers of larvae of the dog tapeworm, Dipylidium caninum; rabbits and hares are intermediate hosts to tapeworms which select foxes. Inspect the feces carefully. Cracks and crevices of the flooring. The parasite sheds periodically its last segments with the feces. These contain ova in large numbers, are motile and quite visible to the casual observer. It is not difficult to detect them. It is possible to obtain ova from crushed segments of the feces of foxes that are infested and they may be identified as to their species. Since all tapeworms require at least one intermediate host in the course of their life cycle, the parasites are quite specific as to the species of the worms. It is necessary to examine segments as well as ova to determine the intermediate host. For instance, fleas are carriers of larvae of the dog tapeworm, Dipylidium caninum; rabbits and hares are intermediate hosts to tapeworms which select foxes. Inspect the feces carefully. Cracks and crevices of the flooring.