The National Fur News

The College Column

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Parasites of Foxes

In the July issue of The National Fur News an introduction to the parasite problem in foxes and other fur-bearing animals was offered, with considerable stress laid upon the fact that this problem must be considered as one of the most serious among the many which the fur breeder has to face.

The truth of this assertion is readily seen when we consider the fact that there is no fur breeder in existence in captivity which is free of internal parasites. It would follow then that there is no rancher who can boast of a parasite-free herd of animals which is operated on a commercial basis. They permit quick salesmen who swear that his concoction, when added to the feed, will force various parasites to high-tail it for more healthful environment than that offered by the interior of a fur breeder. Such a herd will not be clean; this can be easily demonstrated.

Strict sanitation, proper nutrition, and otherwise intelligent ranch management will reduce the incidence of parasitism to a minimum so that the foxes may carry the few, ever-present forms gracefully and without any apparent effect. Since feces will be with the rancher as long as he keeps live animals on the ranch, our concern should be to find out about the degree of infestation, how to combat it, and how to prevent reinfection.

A gratifying thought may be added. The fur farmer in the Rocky Mountain regions is fortunate in most of his fellow ranchers in the eastern States. The incidence and degree of parasitism in and near the Rockies appears to be much lower than anywhere else in the States. This is governed by a number of factors. First, dry climate does not favor developmental phases of many internal parasites outside of the host's body—phases which are necessary for the propagation of the parasite before reinfection begins. This animal can be said to be a much healthier animal. Second, abundant sunlight is detrimental to such developing forms. Third, the types of soils encountered in this region, because of physical structure, do more often than not hinder the development of intermedia stages by insuring high evaporation following rains and dry rapidly, providing the rancher does not permit shrubs, trees, or high weeds to accumulate within and outside the pens. Thus Mother Nature smiles upon the fur breeder in the Rockies, and we certainly should do our part by practicing intelligent ranch management. The prerequisite for such a performance is an appreciation of the nature of parasitism in general and on the ranch, particularly, including the symptomology as well as the intelligent use of prophylactics and therapeutics.

While the journals have carried many excellent articles on parasitism in fur-bearers, a review of the fundamental information at this time should be of value to the fur rancher.

Internal Parasites

Acarids

The common roundworm of the fox, of which we recognize two species, is perhaps the most widely distributed and most persistent internal parasite. It is not difficult to recognize these slender, round, creamy white worms which attain a length up to 30 inches. They do not attach themselves to the lining of the small intestines but remain in the slowly moving food material which is in the process of digestion. They absorb much of the nutrient intended for the animal and discharge digestion products of their own metabolism. This material is toxic to the host and becomes dangerous when many of the parasites are present. Some animals, especially puppies, may harbor such a number of these worms that the intestines become inelastic.

The female worms are capable of producing a tremendous number of eggs which pass out with the feces. These eggs are thick-shelled, therefore very resistant to drying, freezing, dust, or disinfectants. They remain unchanged for at least ten days in the soil or litter and then transform themselves into larvae which become infective. Foxes reinfest themselves by feeding off the ground or drinking from contaminated containers.

The swallowed larvae escape from their shells after the digestive juices have acted upon them, bore through the intestinal wall, into the blood circulation, migrate through the liver and heart to the lungs. Here many of the young worms have grown so large that the blood capillaries containing them rupture. The worms are released into the alveoli, are coughed up through the windpipe and swallowed. (Coughing among young foxes is frequently heard and not always due to the presence of lungworms.) Within a month the young worms reach sexual maturity in the intestines and the cycle repeats itself.

The growing embryos in the pregnant pup female's uterus are already subject to invasion by migrating larval worms. Some of them are small enough to enter the systemic circulation from the lungs and migrate through the fetal membranes into the young. That results in prenatal parasitism, caused by early hunting from which many of the young will never recover. Dry, lusterless fur, potbellies, erratic appetite, and vomited or voided worms are some of the symptoms indicating the presence of ascarids. Such symptoms are brought about not only by the mechanical interference of the parasites with normal digestion but also by the fact that the host is forced to eat much of the toxic digestion products voided by the worms. The symptoms resulting from heavy infestation with roundworms become most pronounced at the age of 3 to 6 months. However, worms are present as a rule long before symptoms appear. It is a good practice to administer an anthelmintic to all puppies at about three weeks of age. The procedure should be repeated in about 10 to 14 days to permit all those larval forms, which were in the late stage of migration, to arrive in the intestines and thus be brought in contact with the vermifuge. While oil of chenopodium is most effective against ascarids, this oil lacks one requirement, namely, it does not act upon hookworms. Therefore also pyrrolidinedione tetrahydroethylene in gelatin capsules, containing a laxative such as arecoline hydrobromide, will be effective in removing ascarids and hookworms.

All adult breeders should be wormed in the late fall or early winter. Low temperatures will kill a large number of external parasites, especially during a worming program, to prevent reinfection.

Good drainage is very necessary. It should be arranged in such a way that water from one pen does not drain into another.

Pen floors should be smooth, bare, and free from any weeds or other material that the soil may not be easily and thoroughly cleaned. Pens should be cleaned of fecal material as often as possible. A sandy, porous, well-drained soil is usually preferred for a ranch site when considered in the light of possible control of nematodes by bedding from a table or platform where the food cannot come in contact with the egg-contaminated soil. It is possible to train the animals to eat out of feeders or troughs where contamination of the food is diminished.

The value of wire-floored pens has been definitely established. Many ranchers make a practice of spraying their dirt-floored pens with distillate or tractor fuel once a year. Others often spread 50 to 100 pounds of salt in each pen as a means of controlling worm egg infestation.

Hookworms

The hookworm, or roundworm, is an inhabitant of the intestinal tract of foxes. However, it attacks the host in a somewhat different manner and has a different life cycle, different peculiarities, different habits. However, many basic principles of parasitism control and eradication which apply to the roundworm and other parasites of this nature also apply to the hookworm.

Hookworms are present on most fox ranches. One of the two species, Uncinia stenocephala, is the primary offender.
The parasites are one-fourth to one-half inch long and are attached to the mucus membrane of the small intestine. Hookworms do not attack puppies as early in life as do roundworms. Puppies do not have much hair and in puppies until they leave the kennels and range about freely in the pen for a while. Infestations are seldom seen under 6 weeks of age, and 3 to 5 months is the most susceptible period. However, in infected pens, adults also have hookworms to a large extent.

Life Cycle:

1. Eggs pass out with feces.
2. Division occurs under favorable conditions, and the larva hatches out from the egg in 24 hours.
3. Larva grows on soil, stores food, and becomes infective in about 1 week during which time it has been protected by a sheath.
4. Enters host by ingestion or through skin.
5. Gains access to blood stream and travels through liver, heart, lungs, etc., to ascend trachea.
6. Descends esophagus to come to rest in intestine, the migration taking from 7 to 11 days.
7. Two weeks after the infective larva is ingested, the female starts to lay eggs to begin another cycle.

As in the roundworm, the migrating larvae may infect unborn pups. Like-wise, these larvae cause considerable temporary damage to various organs encountered in their travels.

Hookworms actually graze over areas of the intestinal mucosa. They puncture the mucosa and suck blood, exudates, and lymph rich in nutrients, intended for the animal body. Hookworms ingest large amounts of blood through these wounds and when the mucosa is congested the wound infected continues to bleed. Consequently, anemia is one of the principal symptoms of hookworm infestation. Other symptoms of anemia are: pallor, retardation of growth, emaciation, lethargy and reduced vigor, and dry, lusterless fur with a tendency to curl and become brown. Sunken eyes, emaciation, and discharge are seen in the later stages. Diarrhea is usually present. Bloody feces and mucus are usually passed. The hookworms may make their way out of the mucosa, opening avenues of entrance for pathogenic bacteria.

Pups should be wormed only as symptoms appear, usually 3 to 6 weeks of age if they are in heavily infested pens. Positive diagnosis of hookworms can be made by microscopic examination of fecal samples. This is a good, simple routine.

Tetrachlorethylene is the best anthelmintic for hookworms. The dosage is 1 cc. per pound of body weight, according to the severity of the infection. One ml. acts as a dewormer as well as a preventive as arseline, milk of magnesia, or Epsom salts. In most cases a second treatment should follow in 10 to 14 days. The host is being treated during the body tissues in the larval form when the first treatment was given.

The cycle of the hookworm is much more easily broken outside of the body of the fox than is the corresponding phase of the roundworm. The egg and larva of the hookworm escape from the intestinal tract near the roundworm. Two or three days of very slight frost is sufficient to cause destruction of the eggs, as will drying and sunlight. Russell's worms with wire forms will control hookworms to a satisfactory extent. Salt, lime, and distillate applied to pens will also aid in the control of hookworms. Other factors that contribute to these parasites are good drainage, sunlight, bare, clean pen, satisfactory feeding methods, and suitable soil.