



CONTROL OF HORSE BOTS AND CATTLE WARBLES

Kinds of Bot Flies and How to Recognize Them

In Canada there are three species of bot flies which attack horses. They are known respectively as the nose bot fly, *Gasterophilus haemorrhoidalis* L., the throat bot fly, *G. nasalis* L., and the horse bot fly, *G. intestinalis* DeGeer. They all somewhat resemble bumble bees but are readily distinguished from each other. The nose bot fly is the smallest, being about one-half an inch long. It is darker in colour than the other two and the only one with a conspicuous orange tail. The throat bot fly is a little over one-half an inch long; the front part of the body is of a rusty-red colour, and there is a prominent black band across the middle of the abdomen. The horse bot fly is the largest, being about three-quarters of an inch in length. It is of a fairly uniform brown colour, and differs from the other two bot flies in having smoky patches in the wings.

Injury Done by Bot Flies

The egg-laying habits of bot flies, especially the nose bot fly, cause serious annoyance to horses. When the flies are numerous the animals are terrorized, are kept from grazing and, on the open range, are often goaded into mad stampedes. Work horses which are normally quiet often become unmanageable when attacked by nose bot flies.

The most serious injury, however, is caused by the presence of the grubs attached to the stomach wall of infested horses. They rob the horse of nourishment and, when numerous, cause a run-down condition and occasionally even death during severe winters. Where the bots are attached to the lining of the stomach, inflammation and ulcers often result, and when the bots are numerous, the animal almost invariably suffers from colic and other digestive disturbances. There are also certain poisonous secretions found in bot fly grubs which are absorbed by the horse with subsequent harmful results.

Life-cycle of Bot Flies

The life histories of the three species of bot flies are similar in that all pass the grub stage as internal parasites in the stomachs of horses. This stage lasts from eight to ten months. In late winter or early spring when the grubs

are full-grown, they release their hold on the walls of the stomach, pass through the alimentary tract and fall to the ground. The nose bot grubs usually release their hold before they are full-grown and re-attach to the walls of the rectum, where they may often be seen close to the anus. When the bots reach the ground, they burrow into the soil and there form puparia. The puparium stage, during which a transformation takes place from the grub to the adult fly, lasts from 2 weeks to 3 months. The adult fly then emerges and works its way to the surface of the soil. The adult bot flies do not feed, and after laying their eggs they die.

The egg-laying habits of the bots differ, and this is responsible for their common names. Each fly lays from 150 to 750 eggs. The eggs of the nose bot fly are black with a screw-like stalk and are attached with considerable violence to the short hairs of the lips. It is the sudden attack that causes the animals to become so restive in the bot-fly season. The flies are most active on warm bright days. The throat bot fly lays its yellow eggs almost exclusively towards the base of the long hairs of the upper throat between the jaws. It is the attack of this fly that causes horses to toss their heads continually. The horse bot fly is more sluggish than the other two and does not alarm the horses so much. Its yellow eggs are attached, on cloudy as well as on bright days, to the hairs of the forelegs, especially the inner surfaces, the shoulders, the sides and the mane. The eggs hatch in from 1 to 2 weeks. After getting into the mouth, the young grubs burrow into the flesh of the tongue or the mucous membrane of the mouth.

Control of Bot Flies

The number of bot flies in any district may be greatly reduced through co-operative action on the part of the farmers. As the bots spend the winter in the stomachs of horses, treatment of all the animals within a district with suitable medicaments is the logical procedure. Carbon bisulphide is usually administered in gelatine capsules to expel the bots from the stomach. This is a liquid that readily forms a gas which is fatal to bots but harmless to the animals in the recommended dose. This is $1\frac{1}{2}$ fluid drams to each 250 pounds of body weight. Only a qualified veterinary should administer the capsules, and the animals should be starved for at least 18 hours before and about 5 hours after the treatment. All animals should be treated in the early winter, preferably before December 15.

To guard work horses from bot flies various types of leather protectors have proved satisfactory; these are usually attached to the bit rings so that the lips are protected. These are generally more satisfactory than the wire baskets sometimes provided for this purpose, as they permit the animal to graze. Canvas covers under the jaws give protection from the throat bot fly.

For animals on pasture, darkened shelters afford good protection. If the flies are very numerous, the animals could be stabled by day and pastured by night when no bot flies are active.

WARBLE FLIES

Kinds of Warble Flies and How to Recognize Them

There are two warble flies that attack cattle in Canada. One is known as the common cattle grub or heel fly, *Hypoderma lineatum* deVill., and the other as the northern cattle grub or large warble fly, *H. bovis* DeGeer. Both species are fairly large, dark, hairy flies with bands of yellow or orange, which

give them somewhat the appearance of small bumble bees. The heel fly is about one-half an inch long, and the large warble fly is about one-twelfth of an inch longer. They both occur in every province in Canada and are serious pests wherever stock is raised.

Life-cycle of Warble Flies

There are small differences in the life-cycles of the two flies, but in general they have the same habits. The differences lie in such points as the following: (1) the heel fly appears early in the season, March to June, while the large warble fly is active from early June until August; (2) the heel fly lays its eggs in rows on the hairs, and the large warble fly attaches only one egg to each hair. In both species each female lays from 400 to 800 eggs. The eggs are laid during bright, sunny days on the legs and lower parts of the cattle and are attached to the hairs. The small grubs hatch out in from three to seven days, penetrate the skin, migrate through the system of the animal, and in some cases collect in large numbers in the region of the gullet. They remain there during the late summer and until early winter, when they again migrate, and finally come to rest under the skin of the back. Here the grubs form cysts and make breathing holes in the skin. After some weeks in this position, the full-grown grubs squeeze their way through the breathing holes and drop to the ground. This is usually in late winter or early spring. They now change into black, hard, seed-like objects about three-quarters of an inch in length from which, in 4 or 5 weeks, the adult warble flies emerge. Like the bot flies, warble flies do not feed. After emergence, mating takes place and the fly lays her eggs.

Injury Done by Warble Flies

As with the bot flies, injury by warble flies is of two kinds. Great harm may be done to stock when the animals become terror-stricken on the approach of the flies. This is a peculiar reaction, as the flies do not sting, but invariably during the egg-laying season cattle will rush madly about in efforts to evade the flies. This results in reduction of the milk yield of dairy cattle and loss of flesh in beef animals.

The chief injury is damage to the beef carcasses, due to the presence of the warble cysts. These affected portions must be trimmed from the carcass, and, as they occur usually in the more expensive cuts in the back and loin, the damage done by trimming and the resultant disfigurement is considerable.

Injury to hides results in large losses. Any hide showing 5 or more grubs automatically goes into the No. 2 grade and is discounted at least 1 cent per pound.

Warble grubs contain a substance that is very poisonous when injected into cattle. This happens when grubs are crushed by an animal crawling under a fence, or through careless extraction of grubs as a control measure. If the fluid from the crushed grub gets into the animal's blood stream, it causes a strong reaction; frothing at the mouth, diarrhoea, and in severe cases death may ensue.

Losses from all causes attributable to warble flies in Canada have been estimated at from \$7,000,000 to \$14,000,000 annually.

Control of Warble Flies

Almost complete eradication of warbles from a district is possible if co-operative control measures are put into effect. Where it is not practicable to organize a whole community, the individual farmer can greatly reduce the numbers of warbles in his herd.

Darkened sheds or brush shelters in pastures are useful, as flies will not attack animals in such places and the animals will make for such shelters immediately the flies appear. If animals can be kept housed during the day and pastured at night, they can be kept free of infestation.

In small or valuable herds, hand extraction will give good results. This is more applicable to soft-skinned breeds, such as Jerseys and Guernseys, but is less likely to be popular with tough-skinned animals, such as Holstein or range cattle.

The most effective control method is the application of a derris wash. Derris is the ground-up roots of certain species of plants and contains rotenone. It is relatively harmless to man and animals. The wash consists of 1 pound of standardized derris powder, $\frac{1}{2}$ pound of soap powder, and $\frac{1}{2}$ pound of diatomaceous earth combined with 2 gallons of water. The earth and soap are added to a gallon of warm water and stirred slowly. When the mixture is smooth and soap-like, the derris powder is added with constant stirring until the mass is like a sloppy bran mash. It may be necessary to add extra water while doing this, then, when a smooth mix is obtained, the remainder of the water can be added and the whole violently agitated. The wash can be placed in bottles, and is applied to the backs of the animals with a cloth or brush where grubs are located. It is important to be sure that the wash is well rubbed into each cyst. The main batch of wash should be stirred frequently. It is advisable to prepare only sufficient for immediate use. Four treatments should cost from 4 to 6 cents per animal.

The dates for applications of derris wash vary in different parts of Canada. Generally speaking, the first wash should be applied in the early spring when the swellings on the backs of the infested animals become conspicuous. In the interior of British Columbia, the first treatment should be given in mid-February; in the Prairie Provinces and Eastern Canada, about the third week in March. The second and third applications should be made at intervals of 28 days and, if practicable, a fourth after a further interval of 35 days. More than one wash is necessary because the grubs do not all mature at the same time.

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