

## Life-cycle and control of the vectors *Hypoderma lineatum* and *Stomoxys calcitrans* causing major animal diseases

### *Stomoxys calcitrans*

The stable fly (*Stomoxys calcitrans*), is also sometimes called the “biting fly”, "biting house fly" or “dog fly”. This fly is a synanthropic (associated with human activities) pest, mainly biting horses and cattle, but also humans, dogs and pigs in order to obtain blood. Stable flies are difficult to distinguish from house flies, the main difference being stable flies have a bayonet like mouthpart (proboscis) protruding from the front of the head.

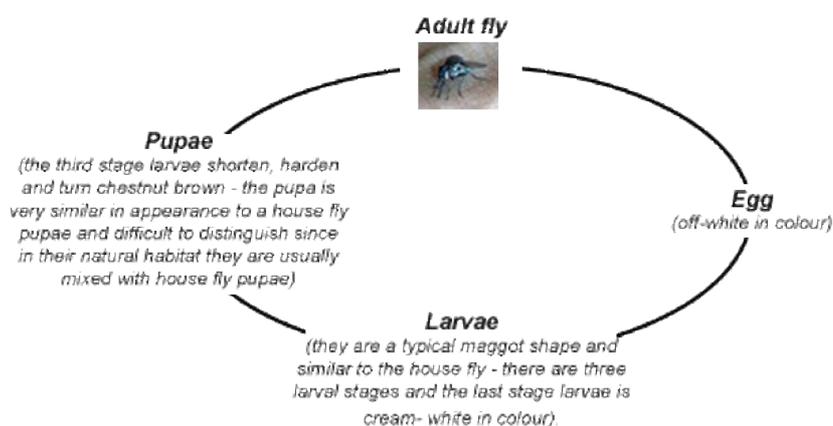
*Stomoxys calcitrans* is a daytime feeder. The adults of both sexes feed on blood. There is low host specificity; although they feed mainly on the blood of cattle and horses. Adults locate a host by sight, and feeding is usually completed in two to five minutes. After feeding the stable fly is sluggish, and remains motionless near the host.

### Life cycle

The stable fly breeds in a number of habitats commonly found in agricultural areas such as decaying straw, oats, rice, barley, wheat, silage, horse manure, and cow manure.

The female has a greatly extended pseudovipositor with which she deposits eggs into decaying straw where there is moisture. Eggs are laid singly, or in bunches of 25 or 30. This activity usually lasts for about half an hour. Eggs are laid in a habitat that will provide food suitable for larval growth and development.

Eggs hatch in one to four days and the hatching period is affected by temperature, humidity, and how long the egg was retained by the female. The larvae can develop in a range of animal manures, spilled feed and rotting organic material. Pure manure rarely supports larval development, while rotting organic matter, either alone or in combination with various animal manures, is an ideal medium. For example, poultry litter that has aged after exposure to soil and moisture is heavily exploited by stable flies. The larval stage lasts from 11 to 30 days, based upon habitat suitability and availability of food. After the third instar (growth stage) the maggot will pupate for 6 to 20 days. As with larval maturation, length of pupation is based upon food abundance and quality during larval growth.



### Control measures:

1. Destruction of breeding grounds/prompt removal of manure
2. Spraying of insecticides
3. Covering animals with blankets
4. Use of repellents

## Hypoderma lineatum

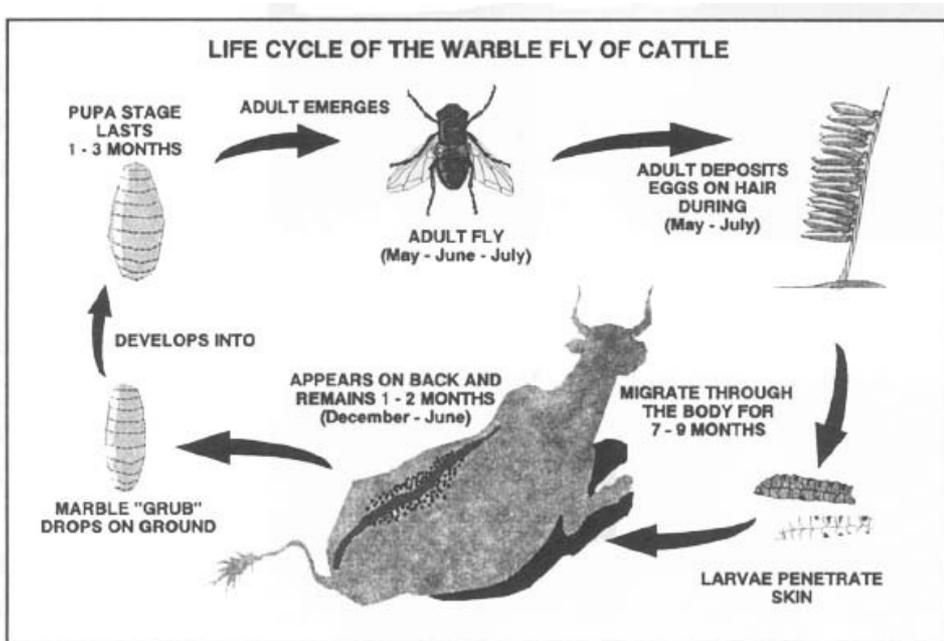
*Hypoderma lineatum*, commonly called cattle grub or warble fly, ranges throughout North America, from Northern Canada to Northern Mexico. It is also found in Asia, Europe, and Africa. It inhabits dry areas where host animals (generally large mammals) are abundant.

The adult is hairy and has a distinctive yellow-and-black striped pattern, resembling a bumblebee. It has a pair of functional wings and a pair of halteres posterior to the wings. Its mouthparts are vestigial and non-functional.

### Life cycle:

The life cycle of *H. lineatum* normally spans a year's time, with warbles forming most abundantly during March and April and adults normally appearing in April and May. The *Hypoderma lineatum* cycle tends to shift one to two months earlier in southern climates. Adults mate within the first few days of emerging from the pupae.

Eggs are laid in rows of 5 or more (up to 16) on hairs, normally on the legs or lower abdomen of the host. One female may lay up to 800 eggs per host. After the egg is laid, larvae hatch within one week. Larvae then burrow through the skin of the host into the subcutaneous connective tissue, to begin its first migration. It travels, from the initial site of penetration, through the connective tissue until it reaches the submucosa of the host's esophagus where it will stay and develop through the winter. As winter is ending, the larva (still a first-instar) migrates through the connective tissue from the esophagus towards the lumbar portion of the host where it will remain for one to two months. During this time, the larva molts twice and grows significantly. For respiration, the larva situates its posterior spiracular plate towards a hole that it cuts or eats through the hide of its host. The mature larva squirms its way out of the hole (warble) and drops onto the ground when it is ready to pupate. It then burrows into the ground where it will remain in its puparium for 3-6 more weeks, depending upon environmental factors such as moisture level (humidity levels greater than 10% impede the maturation process) and temperature. After the adult emerges from the puparium, it only has 3-5 days to reproduce and start the cycle all over again before dying.



### Control measures:

1. Oral administration of synthetic organophosphates to kill the migrating larvae before their arrival in the back.
2. Application of avermectins to kill 2<sup>nd</sup> and 3<sup>rd</sup> instar larvae in warbles.
3. Removal of hair of animals especially from legs
4. Stabling of cattle during day time.