



## NEW WORLD SCREWWORM (*Cochliomyia hominivorax*)

ANIMAL GROUP AFFECTED	CLINICAL SIGNS	FATAL DISEASE?	TREATMENT	PREVENTION & CONTROL
Warmblooded animals	Fly larvae burrowing deep and head-downwards into pocket-like wounds	Possibly, if patient is not treated.	Organophosphorous insecticides	Quarantine Insecticides Sterile Insect Technique

<b>Fact sheet compiled by</b> R. De Deken, Institute of Tropical Medicine of Antwerp, Belgium	<b>Last update</b> December 2008
<b>Fact sheet reviewed by</b> Jan Slingenbergh, FAO - Rome Marc Coosemans, Institute of Tropical Medicine of Antwerp, Belgium	
<b>Susceptible animal groups</b> Domestic animals and many species of wildlife are affected	
<b>Causative organism</b> <i>Cochliomyia hominivorax</i> ( <i>Coquere!</i> ) is an obligatory agent of myiasis belonging to the family of Calliphoridae. The larvae of this dipteran are armed with broad, encircling bands of spines (resembling the threads of a screw) and they tunnel deeply head-downwards into the host's tissue (like <i>Chrysomya bezziana</i> ). Such larvae are commonly named « screwworms ».	
<b>Zoonotic potential</b> The New World screwworm is primarily a veterinary pest, although infestation of man is regularly reported.	
<b>Distribution</b> Parts of Central America, the Caribbean islands and the northern countries of South America (up to the north of Chile and Argentina). <i>C. hominivorax</i> does not survive when mean temperature is below 9°C for 3 months or below 12°C for 5 consecutive months. Therefore sufficient cold winters eliminates the fly, but the fly can during the summer disperse widely from its overwintering areas, moving 56 km per week. The fly has been eradicated by major control programmes utilising the Sterile Insect Technique (SIT) in central and southern USA, Mexico, most of Central America as well as in Libya, where <i>C. hominivorax</i> was accidentally introduced in 1988.	
<b>Biology of the fly</b> The reproductively mature female, at 4-5 days of age seeks out wounds on warm-blooded animals to oviposit. The female lays at three-days intervals batches of about 200 eggs on wounds or mucous membranes. Within 24h larvae emerge and burrow deeply into the wound. After 5 to 7 days larvae leave the wound and pupate in the soil. Development rate of immature stages is influenced by environmental and wound temperatures, being slower at low temperatures. The pupal stage can vary from one week to 2 months. Thus the complete cycle may take between 3 weeks to 3 months. The typical life span of the fly is about 10 days, which allows time for the completion of two vitellogenic cycles. But some females achieve an extended life span of 4-5 weeks. The female fly generally mates once in a lifetime. Population dispersal distances depend on sex (females disperse farther than males), and environmental favorability. Individual flies were found to cover distances up to 290 km in two weeks.	
<b>Clinical symptoms</b> Infestations are generally acquired at sites of wounds (natural or surgical) or at the navel of newborns but they may also occur at the mucous membranes of body orifices. The larvae, closely packed with their heads down, feed on the living flesh and body fluids deepening the wound. Infested wounds are generally socket-like and circular. At first sight larvae may not be visible, while they are situated deep in the wound. Infested wounds have a characteristic odour which is attractive to gravid flies of the same or of other myiasis-producing species. In a severe infestation that is left untreated, death may occur within 5 to 10 days.	
<b>Diagnosis</b> 1. Direct methods Morphological characteristics of the larvae : Larvae being collected for diagnosis should be removed from the deepest part of the wound to reduce the possibility of collecting non-screwworm species. The second instar larvae of <i>C. hominivorax</i> can be diagnosed by the dark pigmentation of the dorsal tracheal trunks for	



over half their length in the terminal larval segment. In third instar larvae (L3) this pigmentation extends forward from the twelfth up to the tenth or ninth segment (larvae conserved in preservative may need dissection). Segments 2 to 10 of the larva bear prominent rings of spines. The posterior spiracles on the terminal segment are surrounded by a dark incomplete ring (the peritreme) which encloses three straight slits pointing towards the break in the peritreme. Presence of a dark button adjacent to the opening in the peritreme.

Morphological characteristics of the fly : deep blue to blue-green metallic body colour with three dark longitudinal stripes on the thorax and large orange-yellow eyes. Hairs on the lower squamae only present at the base and borders.

2. Indirect methods

For the layman it is difficult to distinguish immature screwworms from immatures of other fly species occurring in wounds. Therefore monoclonal antibodies, highly specific for *C. hominivorax*, are used in an enzyme-linked immunosorbent assay, that differentiates New World screwworm eggs, larvae, pupae, and adults from those of closely related secondary screwworms. Restriction fragment length polymorphisms in polymerase chain reaction amplified fragments (PCR-RFLP) of mitochondrial DNA can also be used to differentiate species of New World screwworms (even larvae preserved in alcohol or pinned adults).

**Material required for laboratory analysis**

Samples of the myiasis-producing larvae (preserved in acetic alcohol) or adult specimen (dried or preserved in 70% ethanol).

**OIE Reference Laboratory**

- **Dr Agustin Sagel**  
COPEG Panama/US Commission for the Eradication and Prevention of NWS)  
Apartado Postal 0816-07636  
PANAMA  
Tel: (507) 296.00.06 Fax: (507) 296.09.69  
Email: [asagel@copeg.org](mailto:asagel@copeg.org)  
Email: [veter56@yahoo.com](mailto:veter56@yahoo.com)  
Email: [tinso24@hotmail.com](mailto:tinso24@hotmail.com)

**Relevant diagnostic laboratories**

FAO collaborating centre for identification of myiasis causing insects : Department of Entomology (Drs Martin Hall and Paul Ready), Natural History Museum, London , UK.

**Treatment**

Organophosphorus insecticides, such as coumaphos or fenclorphos, are recommended for the treatment of animals infested with screwworm. Infested wounds can be treated with an aerosol of 1% diclofenthion or with five grams of 5% coumaphos wettable powder either sprinkled directly onto the wound or brushed into the wound as a paste after first being mixed with 33 ml of ordinary cooking oil. Any dead larvae remaining in the wounds should be removed in order to prevent sepsis. When a group of animals is infested, spraying the animals with an 0.25% aqueous suspension of coumaphos would be indicated.

In infested area fly numbers can be suppressed by traps baited with an attractant (swormlure).



**Prevention and control in zoos**

To prevent the spread of the disease beyond present limits, strict observation of the requirements for international trade, as set out in the OIE International Animal Health Code, is necessary :

When importing from countries considered infested with new world or old world screwworm, Veterinary Administrations should require for domestic and wild mammals the presentation of an international veterinary certificate attesting that:

- 1) immediately prior to loading, the animals have been inspected on the premises by an Official Veterinarian and that any infested animal has been rejected for export;
- 2) immediately prior to entering the quarantine pens in the exporting country:
  - a) each animal has been thoroughly examined for infested wounds by an Official Veterinarian and that no infestation has been found in any animal; and
  - b) any wounds have been treated prophylactically with an officially approved oily larvicide at the recommended dose; and
  - c) all animals have been dipped, sprayed, or otherwise treated, immediately after inspection, with a product officially approved by the importing and exporting countries for the control of new world or old world screwworm, under the supervision of an Official Veterinarian and in conformity with the manufacturer's recommendations;
- 3) at the end of the quarantine and immediately prior to shipment for export:
  - a) all animals have been re-examined for the presence of infestation and all animals have been found free of infestation;
  - b) all wounds have been prophylactically treated with an approved oily larvicide under the supervision of an Official Veterinarian;
  - c) all animals have been prophylactically treated again by dipping or spraying as in point 2) above.

The floor of the quarantine area and transport vehicles must be thoroughly sprayed with an officially approved larvicide before and after each use. The transit route must be the most direct, with no stopover without prior permission of the importing country.

On arrival at the importation point, all animals must be thoroughly inspected for wounds and possible new world or old world screwworm infestation under the supervision of an Official Veterinarian. The bedding material of the vehicle and the quarantine area should immediately be gathered and burned following each consignment.

Insecticidal treatment of animals can be carried out by coumaphos spray or doramectin injection. At a dose rate of 200 µg/kg B.W. doramectin is 100% effective in preventing *C. hominivorax* infestations whereas ivermectin efficacy is incomplete. Protection after a single injection of doramectin lasts 10 to 20 days.

**Notification**

**Guarantees required under EU legislation**

**Guarantees required by EAZA zoos**

**Measures required under the Animal Disease Surveillance Plan**

**Measures required for introducing animals from non-approved sources**

**Measures to be taken in case of disease outbreak or positive laboratory findings**

**Conditions for restoring disease-free status after an outbreak**

**Contacts for further information**

**References**

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