Standard Operating Procedure for Possible Detections of New World Screwworm in Dogs

New World Screwworm (NWS) myiasis is a foreign animal disease (FAD) in the United States. The Animal and Plant Health Inspection Service (APHIS) Veterinary Services (VS) has developed this guidance for veterinarians and/or animal health officials examining dogs with suspected screwworm lesions. This includes dogs imported into the United States. The procedures detailed below provide guidance on identifying screwworm lesions, notifying pertinent Federal and State animal health officials, submitting samples for laboratory analysis, quarantine and treatment of affected dog(s) and subsequent cleaning, disinfestation and monitoring of the premises.

1. Identification and Notification of Suspect Cases
    a. Screwworm infestation is most often associated with the presence of a pre-existing wound but may also be found in mucous membranes. Any wounds should be examined for the presence of myiasis (infestation with larval flies/maggots). Areas of infestation may be malodorous and suppurative with bloody or purulent discharge. **See USDA brochure referenced in the "Additional Resources" section of this document for pictures of screwworm infestation in animals.**
    b. If screwworm myiasis is suspected in a domestic or imported dog, the examining or official veterinarian must take the following actions:
        i. Contact the APHIS VS Area Veterinarian in Charge (AVIC) for your state and your State Animal Health Officials (SAHO). The APHIS AVIC and/or SAHO is responsible for initiating an FAD Investigation per VS Guidance Document (VSG) *12001 Policy for the Investigation of Potential Foreign Animal Disease/Emerging Disease Incidents (FAD/EDI)*.
        ii. For imported dogs, additionally contact the APHIS VS Live Animal Import (LAI) unit: LAIE@usda.gov, copying Dr. Mary Kate Anderson (marykate.anderson@usda.gov). APHIS LAI will notify other APHIS VS units, and the Center for Disease Control and Prevention (CDC) Dog Import team.
2. Submission of Samples to the National Veterinary Services Laboratories (NVSL)
    a. The examining* or official veterinarian must take samples of suspected screwworm larvae and send them to NVSL for official identification.
    b. Samples should not be collected nor submitted without first consulting with the APHIS VS AVIC or the SAHO. In most cases, a Foreign Animal Disease Diagnostician from APHIS VS or the State will be dispatched to collect samples.
        i. To obtain specimens for identification, gently remove larvae from several sites and depths within the open wound using forceps.
        ii. Because secondary myiasis may be present and is most often found near the surface of the wound, it is especially important to collect specimens from the deepest part of the wound. If possible, collect larvae of different sizes for submission.

*A licensed/USDA Accredited veterinarian may perform these functions if permitted under State authority/regulations.

iii. Place the specimens in a tightly closing vial or test tube and preserve the specimens in alcohol (ethyl or isopropyl) at room temperature. The concentration should be 70 percent by volume.

iv. Specimens should be submitted to the NVSL with a Parasite Submission Form (VS Form 5-38) available on the APHIS website.

v. Specimen mailing address:

NATIONAL VETERINARY SERVICES LABORATORIES
1920 Dayton Avenue Ames, IA 50010
Telephone: 515-337-7514

vi. Email NVSL (VS.DB.NVSL.DBRL.Parasitology@usda.gov) at the time you ship the specimen to notify them that a suspect screwworm myiasis sample is in transit. Include shipment tracking information.

3. Quarantine and Treatment of the Affected Dog

a. **Quarantine:** The dog must be held in quarantine under the supervision of a USDA accredited veterinarian* or an official (federal, state) veterinarian, until official parasite identification has been obtained and effective treatment implemented. APHIS and State Animal Health Officials will determine appropriate quarantine premises, dependent upon location, overall risk and availability of suitable facilities; a veterinary clinic may be acceptable depending on suitability of quarantine area and effective vector control.

b. **Treatment**: dogs confirmed to be affected with screwworm myiasis must undergo effective treatment along with treatment of the surrounding premises.

i. All visible eggs and larvae must be removed from in and around the wound and disposed of as outlined in section 4a below. The wound should then be thoroughly cleaned and disinfected.

ii. Depending on severity, the animal may need extensive wound care, systemic antimicrobials, and analgesia.

iii. The following systemic applications[1] have larvicidal activity and have shown to be effective in eliminating screwworm larvae from affected dogs:

1. Nitenpyram tablets (Capstar®, Novartis Animal Health), following the manufacturer's recommended protocol for flea control. A second treatment should be administered 6 hours after the first administration[i].

2. A single treatment of afoxolaner (NexGard®, Boehringer Ingelheim Animal Health), as per label recommendations, providing at least the minimum dosage of 2.5 mg/kg[ii].

3. A single dose of sarolaner (Simparica® Zoetis) in a single dose orally, following the manufacturer's recommended dose for control of the brown dog tick in dogs[iii].

[1] This list does not imply APHIS endorsement. The attending veterinarian should consider which treatment is most appropriate for the dog, including off-label use considerations.

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4. Ivermectin has also been used in the treatment and prevention of screwworm in dogs.

c. The dog must be re-inspected by the examining* veterinarian 24 hours after administration of appropriate treatment to confirm no live larvae remain in the wound. If live larvae are found, the additional larvae should be removed as outlined in 3b above with continued monitoring of the wound. Additional treatment may be necessary.

d. The dog may be released from quarantine after it is confirmed that no screwworm larvae remain, and the dog is determined by the official veterinarian (SAHO, CDC Veterinary Medical Officer or APHIS VS Veterinary Medical Officer) to be free of screwworm.

4. Cleaning and Disinfesting the Affected/Quarantine Premises

a. All expelled larvae in the environment must be collected into tightly sealed tubes with alcohol to kill the larvae, and Ziploc bagged before throwing in the trash.

b. Kennels/ runs should be first sprayed with insecticide then wiped out to find potential larval or pupal flies. These should be collected and disposed of as previously mentioned. A list of effective insecticides can be found in the USDA APHIS Guidance: List of Pesticides to Potentially Use Against New World Screwworm.

c. Any bedding present in the kennel should be sprayed with insecticide prior to removal, and promptly bagged. Prior to movement offsite/ disposal, drench the bag contents and spray the outside of the bag with insecticide then close tightly. Put this sprayed bag into another bag, spray the inside and outside of that 2nd bag with insecticide, and close/ seal tightly.

d. The kennel/ run should then be washed with warm water and soap to reduce animal exposure to insecticide residue.

5. Premises Monitoring

Note: Other options for premises monitoring may be permissible depending on facility specifics. Contact APHIS VS.

a. In the quarantine area, hang fly paper (or other type of effective fly trap) in several locations (example).

i. Monitor the fly paper weekly (or more often) to ensure sure it doesn't dry out. If the paper is dry, it should be replaced.

ii. Remove all flies found on the paper/trap. Using forceps, gently remove (tease) any flies from the paper trying not to mangle the fly. Put the fly into a vial containing ethanol and send to the NVSL as described above in section 2.

b. Continue this monitoring and submission of any flies obtained at least weekly for a full month after the dog has been released.

c. APHIS VS must be informed of any additional findings of screwworm flies during the monitoring stage post-quarantine.

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Additional Resources:

- Companion Animal Parasite Council
- USDA APHIS Disease Response Strategy for New World Screwworm Myiasis
- USDA APHIS New World Screwworm Brochure
- USDA APHIS New World Screwworm website

[i] Correia, Thais et al; Larvicidal efficacy of nitenpyram on the treatment of myiasis caused by *Cochliomyia hominivorax* (Diptera: Calliphoridae) in dogs; Veterinary Parasitology Volume 173, Issues 1–2, October 2010, Pages 169-172; https://www.sciencedirect.com/science/article/pii/S0304401710003523

[ii] Cutolo, Andre et al; Efficacy of afoxolaner (NexGard®) on the treatment of myiasis caused by the New World screwworm fly *Cochliomyia hominivorax* (Diptera: Calliphoridae) in naturally infested dogs; Veterinary Parasitology: Regional Studies and Reports, Volume 24, April 2021, 100569; https://www.sciencedirect.com/science/article/pii/S2405939021000411

[iii] Cardim de Oliveira, Priscila et al; Efficacy of sarolaner on the treatment of myiasis caused by *Cochliomyia hominivorax* (Diptera: Calliphoridae) in dogs; Veterinary Parasitology, December 2019; 276:108966; https://pubmed.ncbi.nlm.nih.gov/31759192/

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