Swine Ectoparasites: Stable Fly, Stomoxys calcitrans and Other Biting Flies

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Description and Biology

The stable fly is a common biting fly found inside and out of swine facilities. Both male and female stable flies take 1-2 bloodmeals daily and are frequently observed resting in shaded areas while they digest their meal. Females deposit 80-100 eggs in decaying organic matter, typically wet bedding, wasted feed, and mixtures of manure and straw or other bedding. Developmental time of the stable fly is about 15-30 days, the eggs hatch in 1 to 2 days, followed by a 10-15 day larval stage. The larvae then seek a drier environment in which to pupate. Adults subsequently emerge about 6 to 8 days later. In cool climates stable flies are usually active from May through October with numerous generations being produced during this time period. However, in warmer climates conditions allow the stable fly to breed continuously year around. Although stable flies may be infected with PRRS virus under laboratory conditions, the likelihood of transmission is low (Rochon et al. 2011).

Mosquitoes can occasionally be found in large numbers in and around swine facilities. Female mosquitoes require a bloodmeal at 3 to 5 day intervals to produce eggs. Depending on the species, mosquitoes deposit their eggs either directly on the water, or in marginal areas where water, soil and vegetation interface. The developmental time and number of generations produced annually varies with species and region. Occasionally large numbers of mosquitoes may be produced in pastures where rainfall or irrigation runoff has accumulated. Mosquitoes may also be produced in large numbers in swine waste lagoons. The potential for mosquitoes to vector diseases of swine is most important in Asia where Japanese Encephalitis is an acute mosquito borne viral infection of pigs. This disease is extremely rare in North America.

Figure: Biting gnats, or noo-see-ums, are season pests of swine.

Host seeking black flies (family Simuliidae) may also frequent swine facilities. Females are the only life stage to take bloodmeals. While some species produce only one generation per year, others may have several. Females produce 2-3 batches of >100 eggs that are deposited on the water or on aquatic vegetation. The immature stages of black flies develop in swift flowing water sources. Pupation occurs in slower moving water and may take days to weeks before the adult emerges and takes flight. Adult black flies are strong fliers and may disperse more than 10 miles from their breeding site in search of a host.

Biting midges or "no see ums' include a large number of gnats in the family Ceratopogonidae (Figure 4). These tiny blood-feeding flies develop in wet or semiaquatic habitats, some genera prefer sandy or clay soils, others prefer manure polluted mud or moist soil around streams, ponds, sloughs, and marshes. Biting midges are also capable of breeding in and around anaerobic swine waste lagoons. Female midges deposit their eggs in moist habitats about a week following their first bloodmeal. These eggs hatch about 7 days later and larvae may take 14 days or more to complete development. The long slender larvae feed on microscopic organisms in the water and respire through their cuticle. Pupation occurs in muddy margins near the waters surface. Most species including Culicoides veriipennis and Culicoides sonorensis have several generations per year.

Economic Importance

Stable flies are a common pest found in both urban and rural settings. Although these flies typically breed in mixtures of manure, urine and straw, they also occur where there are no apparent breeding sites (Rochon et al. 2011). Direct economic losses in pork production resulting from stable fly infestations have not been documented. Although stable flies have not been shown to cause direct losses in animal performance, considerable expenditures in control costs targeted at this pest may be incurred by pork producers. While these expenditures may not technically be considered "losses", they nonetheless constitute a significant investment above return.

Figure: Dermatitis may be caused by bloodfeeding mosquitoes, or biting gnats. Photo by R.D. Moon.

Mosquitoes, black flies and midges are common anywhere established suitable habitat is found (Prullage 1988). The direct economic impact of mosquitoes, black flies and biting midges on swine has not been studied. There is a much greater disease concern when these pests are abundant. In North America, mosquitoes are the primary vectors of a group of arthropod borne viruses that cause encephalitis in humans and horses including West Nile Virus. Pigs are not known to be integral to the disease transmission cycle in North America. In Asia, however Japanese Encephalitis is an important disease of humans with pigs as the amplifying host and reservoir for the virus.

Vesicular stomatitis virus, a rhabdovirus, is a re-emerging viral infection of cattle, horses and swine in the US (Perez de Leon et al 2006). Outbreaks occur once or twice each decade. The most recent outbreak occurred from 2004-2006. VSV is transmitted between infected and uninfected animals by direct contact with infectious lesions, contaminated fomites and insects (Patterson et al 1955). Insects acquire the virus by feeding on blood or bodily fluids near VS lesions. Biting midges (Culicoides sonorensis), black flies (Simulium vittatum), sand flies (Lutzomyia shannoni) (Comer et al. 1990), muscoid flies (Musca domestica) (Francy 1988) and eye gnats (Hippleates spps. Jenney 1967) have been implicated in the transmission of VSV (Schmidtmann 1999). Culicoides sonorensis, the primary vector of Bluetongue virus in the US, was implicated in the horizontal and vertical transmission of VSV (Drolet et al. 2005).

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