

Adult Male Poultry Red Mites (*Dermanyssus gallinae*) are haematophagous

Francesca Nunn, Eliezer Ramos, Kathryn Bartley, Alasdair Nisbet.

Poultry red mites (PRM) are blood feeding ectoparasites that live off-host, only seeking a bird from which to rapidly engorge a bloodmeal every few days. Despite being a major agricultural pest species [1] relatively little is known about the mite's fundamental biology [2]. Adult females, deutonymphs and protonymphs are known to feed but adult males are thought not to blood-feed or to only feed rarely [3].

Recently, we described using Baudruche membrane in an *in vitro* device to feed adult female PRM [4] using goose blood as a food source, leading to improved, reproducible feeding rates and the device has since been optimised for feeding both haematophagous nymph stages. Here we describe using the device to establish if adult male PRM will feed on blood *in vitro*.

Mixed stages of PRM were collected on farm and stored at 5°C for two weeks before being stored in an environmental chamber at 20°C and 75% relative humidity (RH) for seven days, to allow digestion of their last blood meal. Nine replicate *in vitro* feeding chambers, containing 50 adult female PRM and 10-25 adult male PRM and 9 replicate *in vitro* feeding chambers, each containing 10-25 adult male PRM only, were fed heparinised goose blood for three hours. Following feeding, mites were sorted into "fed" and "unfed" groups. Fed mites (which are easily identified by the presence of fresh blood inside the mites) were monitored for 8 days. Moulting during this period would identify any male mites that were mis-identified originally as deutonymphs (deutonymphs and adult males are similar in gross morphology). Any male PRM which had failed to feed were placed into 100% ethanol for later microscopic confirmation of sex. After 8 days, fed males were also placed in 100% ethanol for lifestage confirmation using microscopy. Male PRM were confirmed by identification of a holovenral shield, which is distinct from the undeveloped epigynal shield in nymphs and developed epigynal shield in adult females, and the genital opening which is absent in other lifestages [2].

In those replicates where male PRM were fed in the presence of female PRM, a total of 48 confirmed males fed in the *in vitro* feeding devices (39% of the total number of males used). Where males were fed in the absence of female PRM, a total of 65 confirmed males fed in the *in vitro* feeding devices (44% of the total number of males used). We have therefore definitively demonstrated that adult male PRM are indeed haematophagous and do not require the presence of co-feeding female PRM to stimulate their feeding behaviour.

1. Flochay et al 2017
2. Pritchard et al 2015
3. Chauve et al 1998
4. Nunn et al 2020