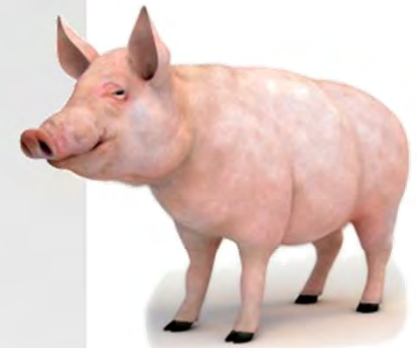


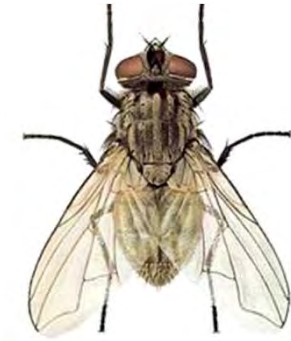
A novel use of macrobials in animal housing



Main pests

Flies

- *Musca domestica*
- *Stomoxys calcitrans*
- *Musca autumnalis*
- *Fannia canicularis*



Mites

- *Dermanyssus gallinae*



Beetles

- *Alphitobius diaperinus*
- *Carcinops pumillio*



Effects

Animal health

- transmission of viruses and bacteria
- stress for animals (decreased production in dairy cattle)
- bites to the animals

Fouling of surfaces (above all eggs)

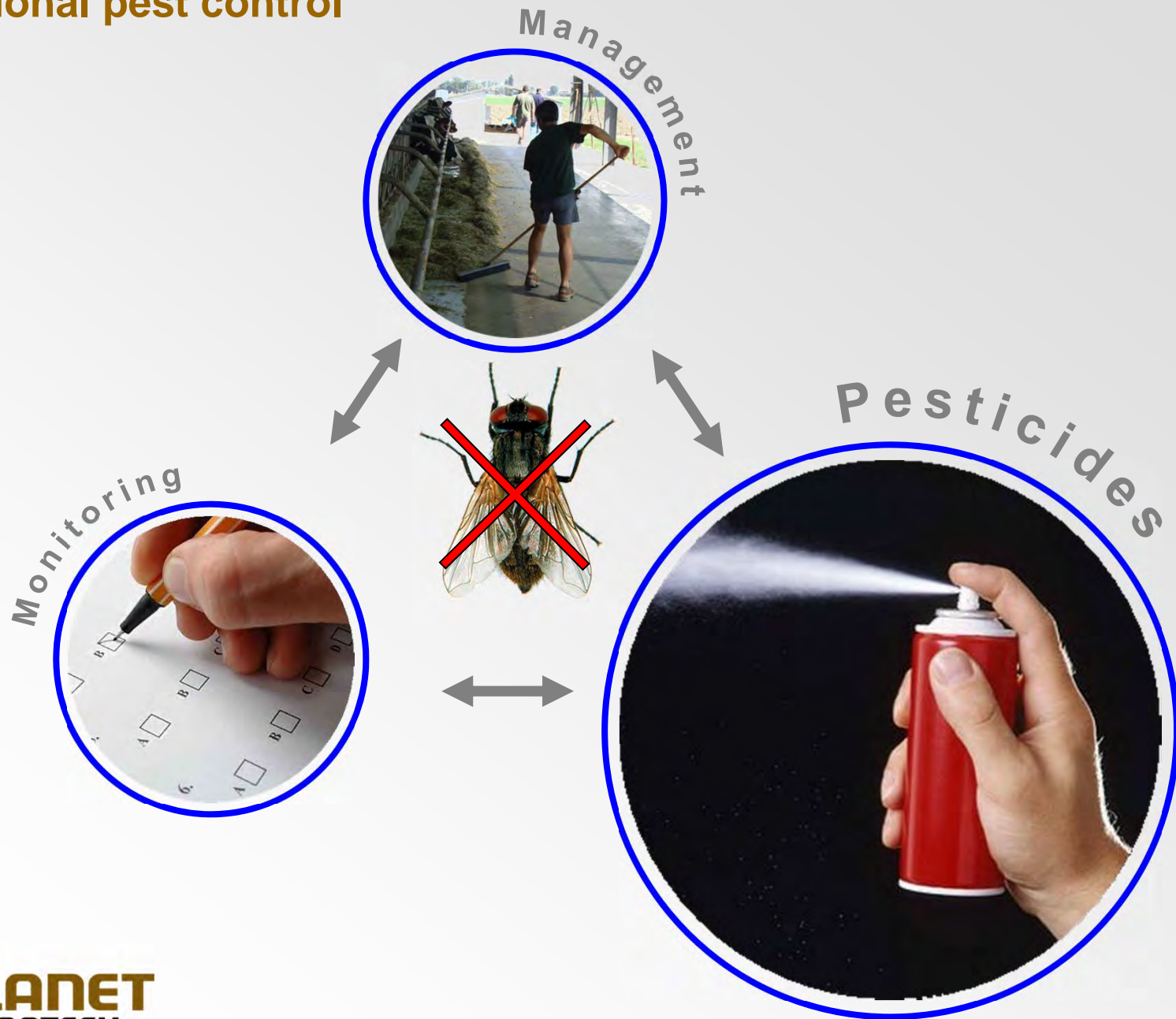
Food contamination

Stress for workers

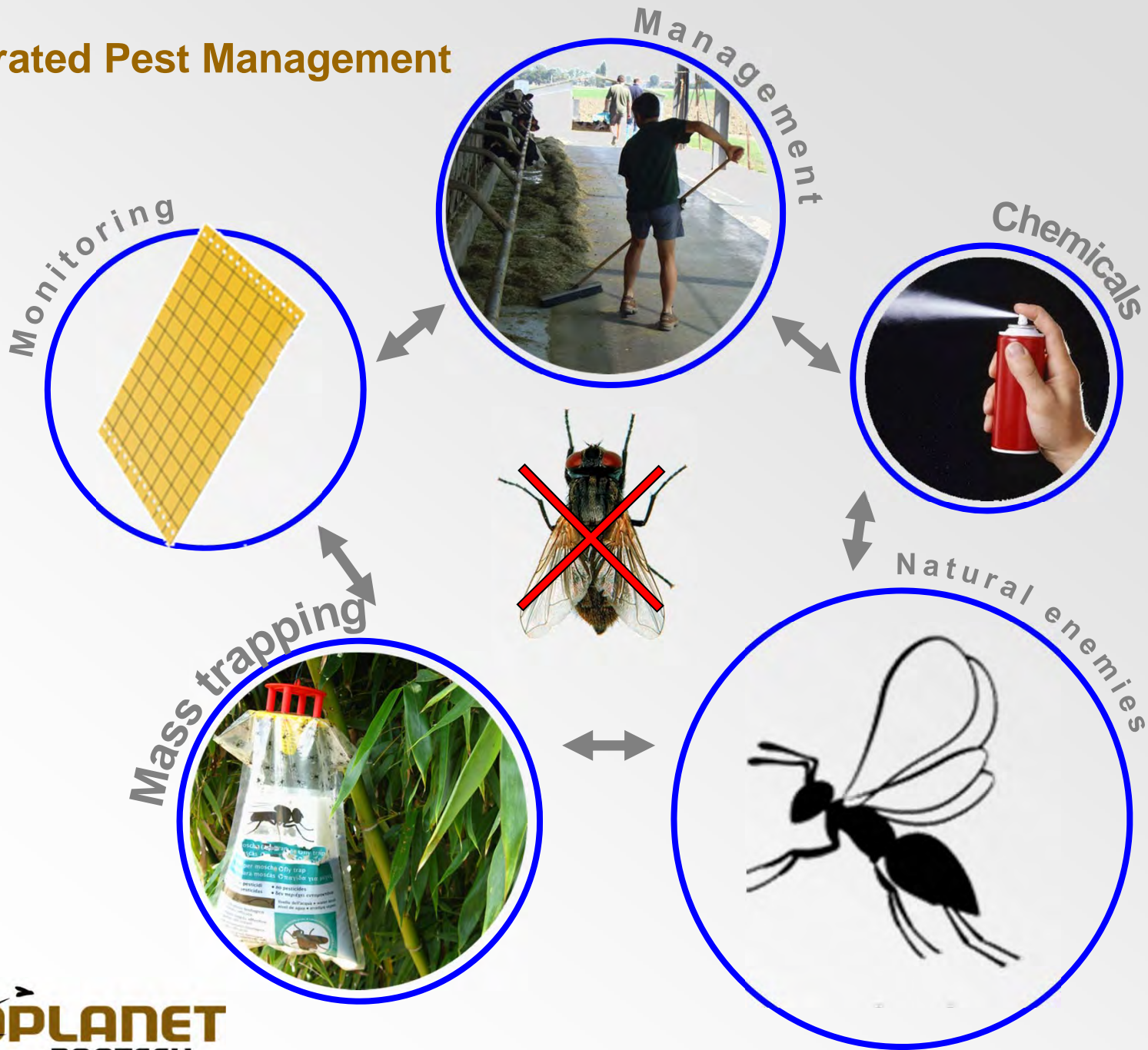
Complaints by neighboring population



Conventional pest control



Integrated Pest Management



IPM Goals

Effective pests control



Animal welfare



Food safety



Environment



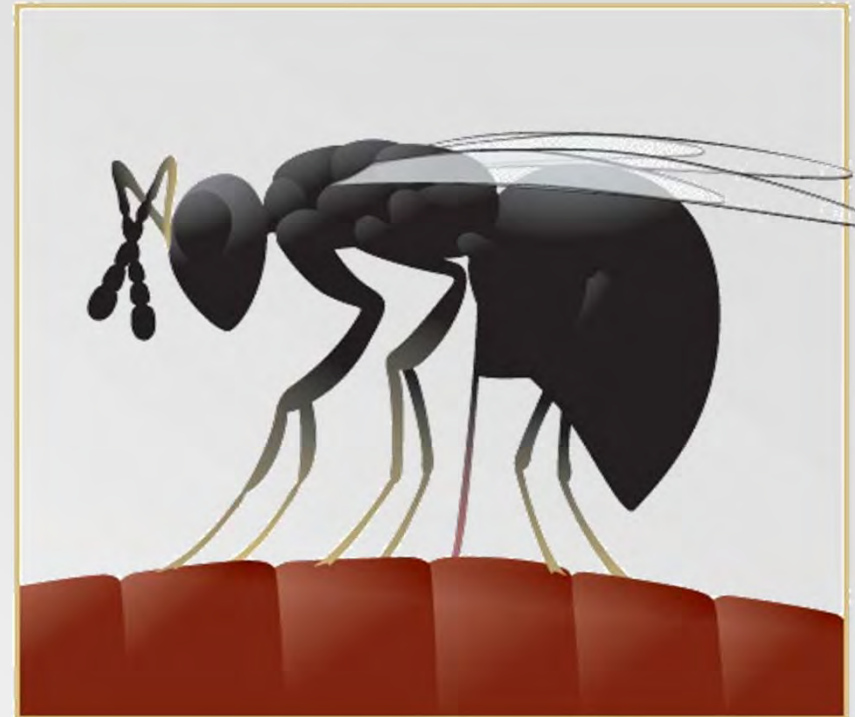
Fly parasitoids

Hymenoptera Pteromalidae

Nasonia - *vitripennis*

Spalangia - *cameroni*

Muscidifurax - *raptor*
- *zaraptor*
- *raptorellus*



Life cycle

Hunting depth

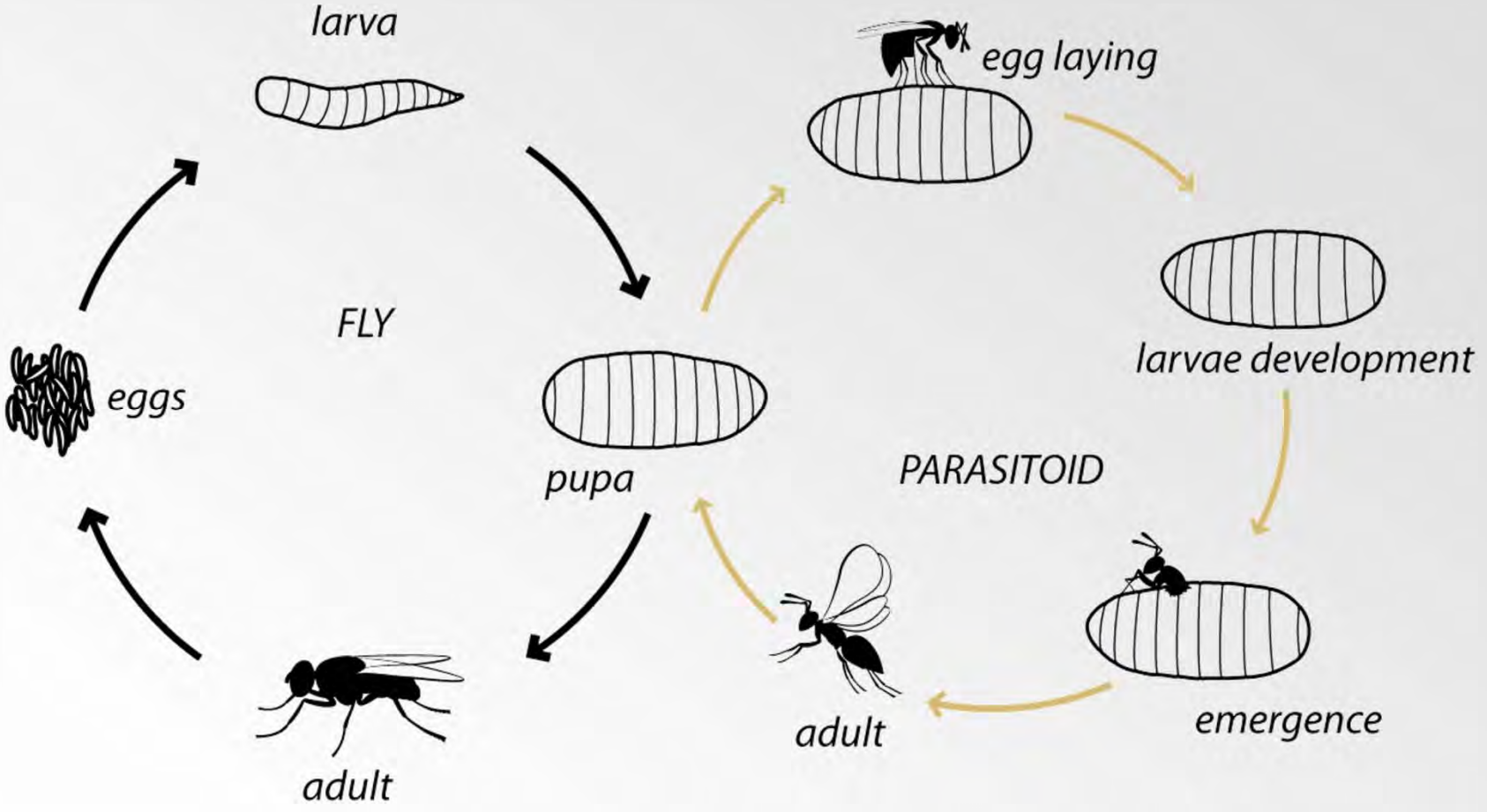
Gregarious or solitarious behavior

Geographical distribution

Fly parasitoids

Parasitoids	Life cycle	Hunting depth	Behavior	Geographical distribution
<i>N. vitripennis</i>	12-15 days	0-3 cm	gregarious	cosmopolitan
<i>S. cameroni</i>	20-28 days	5-8 cm	solitarious	cosmopolitan
<i>M. raptor</i>	17-22 days	0-5 cm	solitarious	cosmopolitan
<i>M. zaraptor</i>	22-24 days	0-3 cm	solitarious	North America
<i>M. raptorellus</i>	12-15 days	-	gregarious	cosmopolitan

Parasitoid life cycle













Fly predator

Ophyra aenescens (Diptera)

Cosmopolitan

Prefers humid environments

Larvae voracious predators of other fly larvae

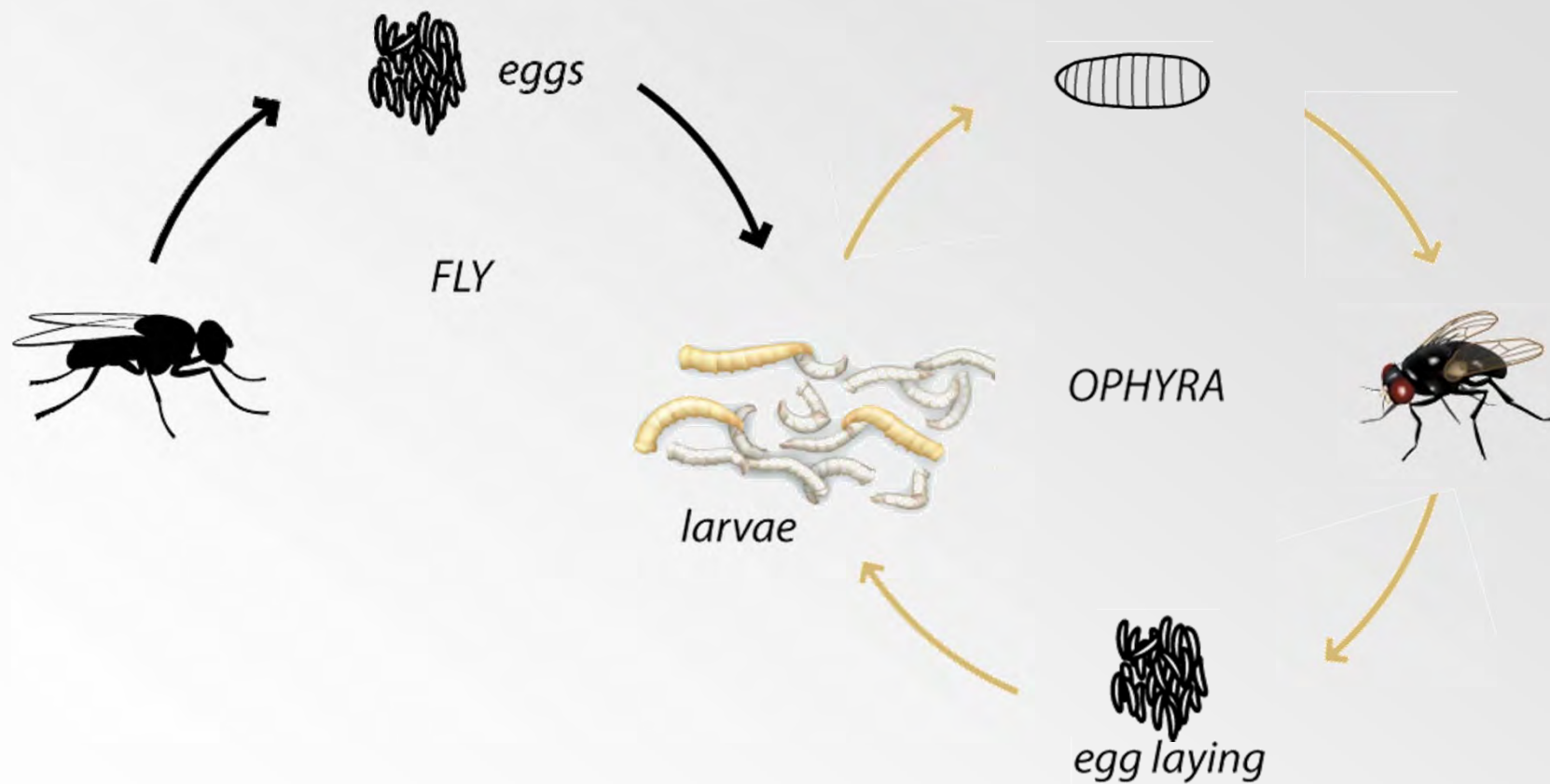
Harmless

(not stay on animals, live hidden in the darkness, stay inside the farm)

Best solution with wet manure as in pigs farms.



Action of the fly predator







Red poultry mite predator

Mites

Androlaelaps casalis

Hypoaspis miles

Hypoaspis aculeifer

Anthocoridae

Lyctocoris campestris



Resistant to most pesticides

Present in very large numbers

Hard to detect

We're unable to eradicate it







Courtesy of Koppert



Jarmo Holopainen



Jarmo Holopainen



Applications fields



Any organic debris where larvae and pupae of flies can develop.

Poultry farms

Breeding cattle for milk / meat

Horses and swine

Dunghills

Landfills

Composting plants

















Thank you.