



INTERNATIONAL

*The key to your profit!*

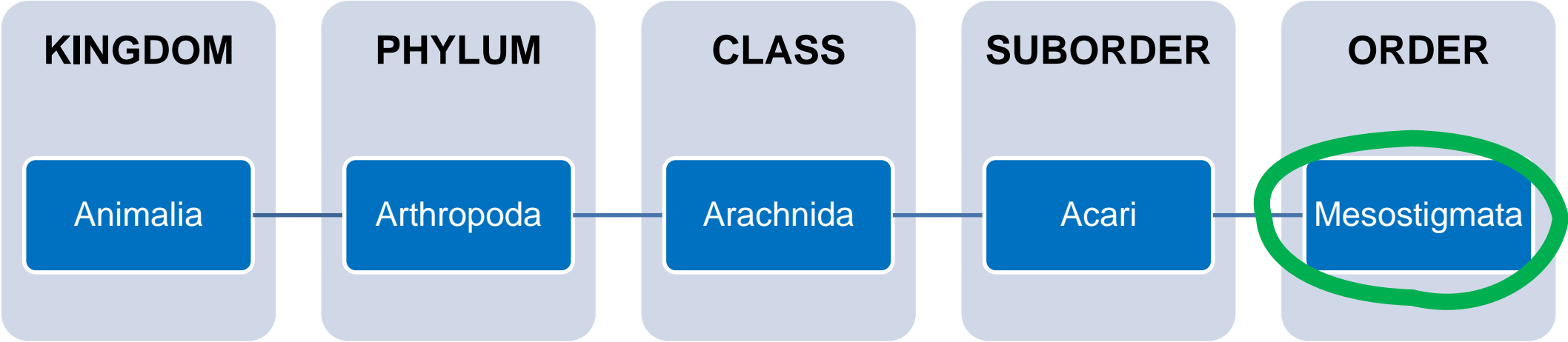


# Approach for controlling mites

Fernando Carrasquer DVM CEAV

Global technical service – H&N International GmbH

# What do you mean when you say mites?



TICKS

*Argas Persicus*

LICES

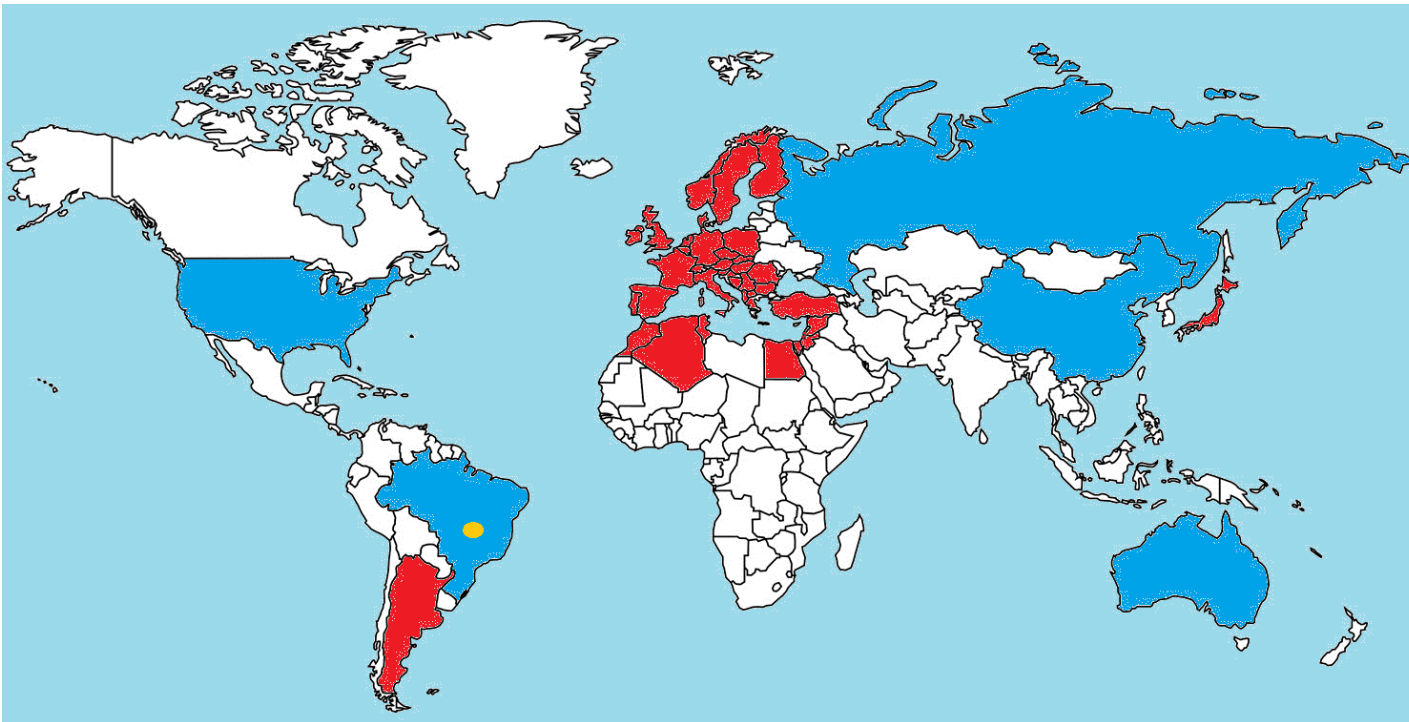
*Eomenacanthus stramineus*

FLEAS

*Ceratophylus gallinae*

Pictures: wikipedia

# Reported mites in poultry industry by country



■ Northern Fowl Mite  
*Ornithonissus sylvarum*

■ Poultry Red Mite  
*Dermanyssus gallinae*

● New feather mite  
*Allopsoroptoides galli*

Tropical poultry Mite  
*Ornithonissus bursa*

# Similarities NFM / PRM

## Northern Fowl Mite *Ornithonissus sylvarum*



Picture: wikipedia

- ✓ Gray to black; red after feeding
- ✓ Infest poultry and wild bird, can infest mammals and humans
- ✓ Blood meals for molting and laying eggs
- ✓ Strong thigmotaxis



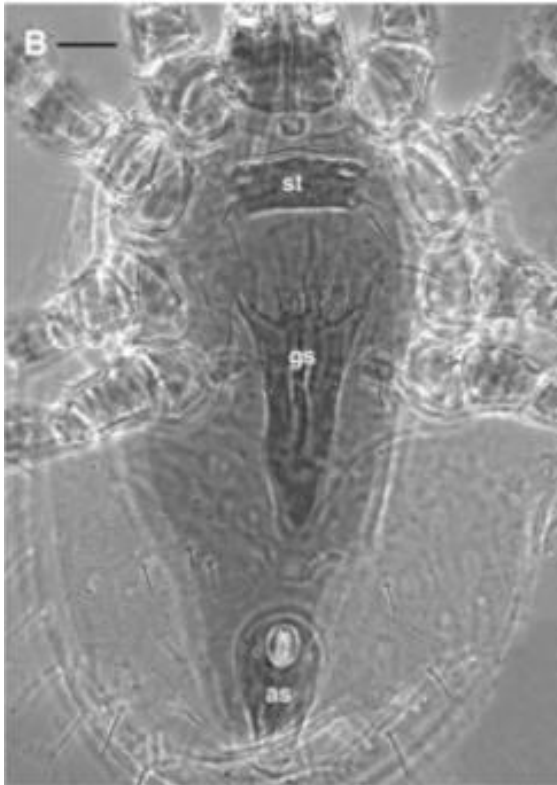
Pictures: wikipedia

## Poultry Red Mite *Dermanyssus gallinae*

- ✓ Gray to black; red after feeding
- ✓ Infest poultry and wild bird, can infest mammals and humans
- ✓ Blood meals for molting and laying eggs
- ✓ Strong thigmotaxis

# Morphological differences NFM / PRM

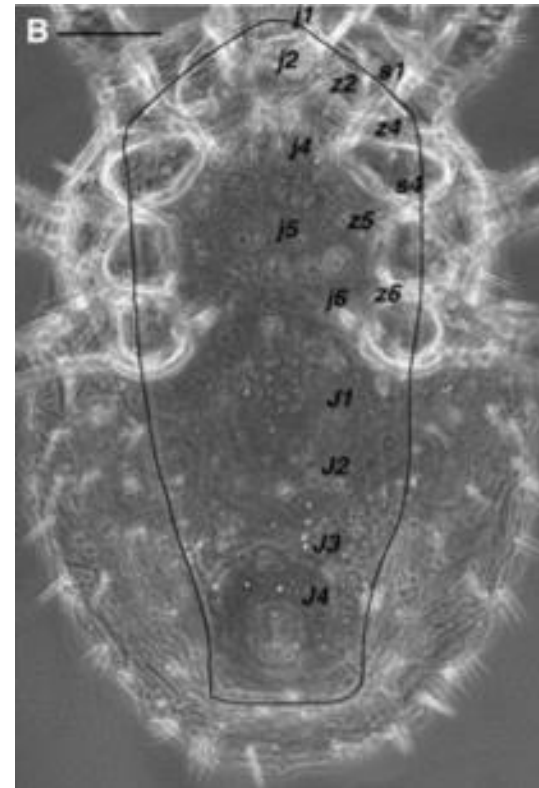
Northern Fowl Mite  
*Ornithonius sylvorum*



✓ Smaller adults ( around 0.6 mm)

Di Palma, 2012

Poultry Red Mite  
*Dermanyssus gallinae*



✓ Bigger adults ( around 1.5 mm)

# Physiological differences NFM / PRM

Northern Fowl Mite  
*Ornithonius sylvorum*



Picture: Hinkle 2018

- ✓ **ECTO PARASITE**
- ✓ On the chicken full time, mostly the vent area
- ✓ Warm weather affects negatively to its micro habitats in the bird
- ✓ Can only survive 3 weeks out of host



Picture: F. Carrasquer

Poultry Red Mite  
*Dermanyssus gallinae*

- ✓ **MICRO PREDATOR**
- ✓ Hide in crevices and cracks during the day, feeds on chickens at night
- ✓ Warm weather enhance its reproductive capacity
- ✓ Can survive for at least 8 months outside of the host

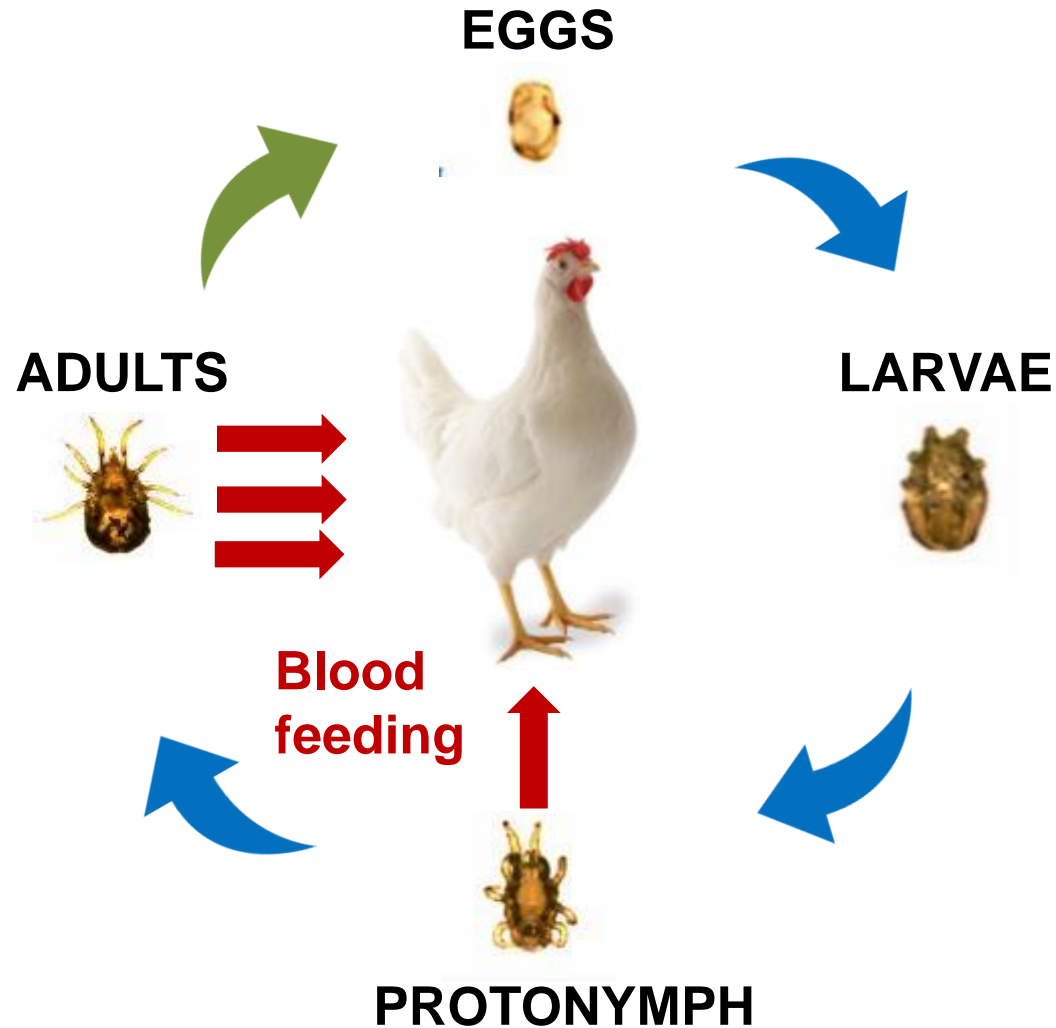


H&N LAYER ACADEMY

**INTERACT WITH US!**

**Make use of our multiple-choice poll tool and pick what you think is correct.**

# NFM Biological cycle

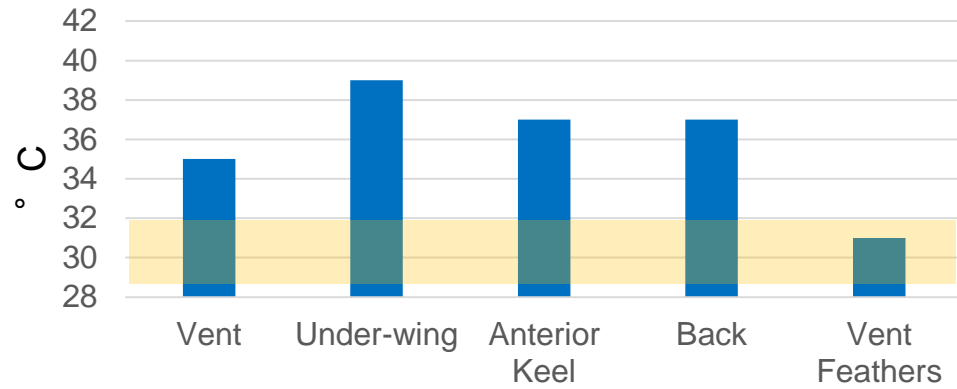


- The complete life cycle requires about 5-12 days to complete
- Completely takes place in the hen
- NFM migrates to parts of the hen's plumage where temperature and humidity are more favorable.

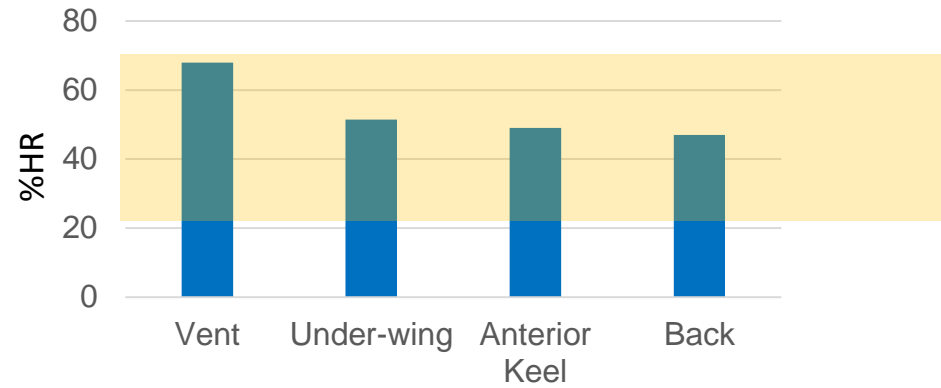


# NFM Ecology

Average hen surface temperature



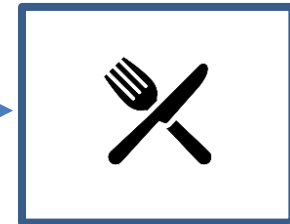
Average hen surface relative humidity



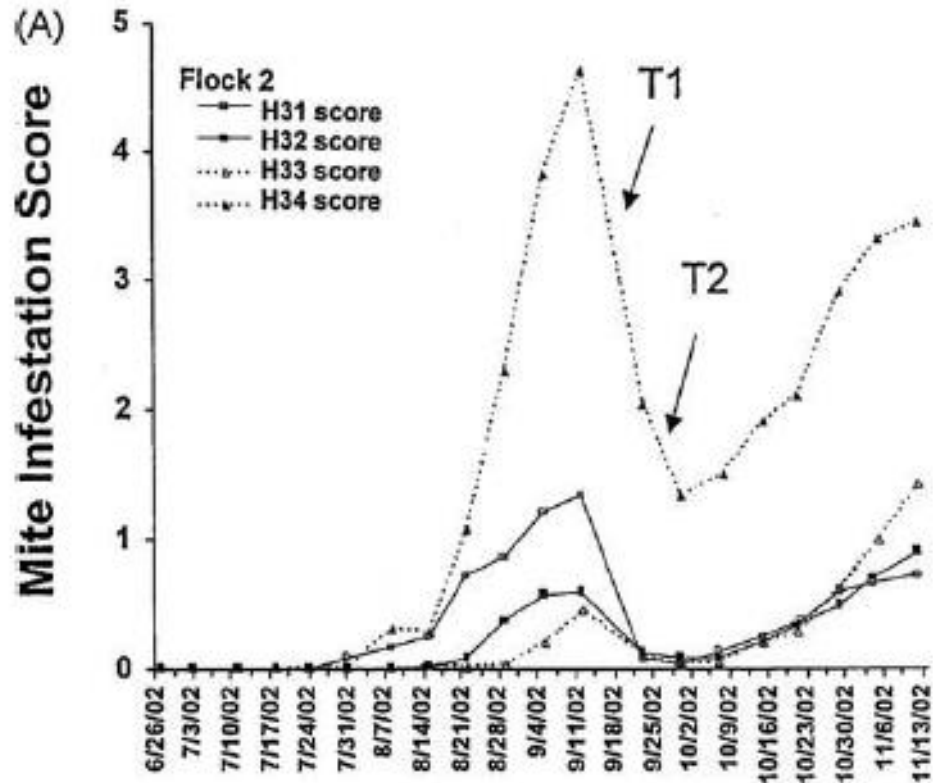
Halbritter 2011



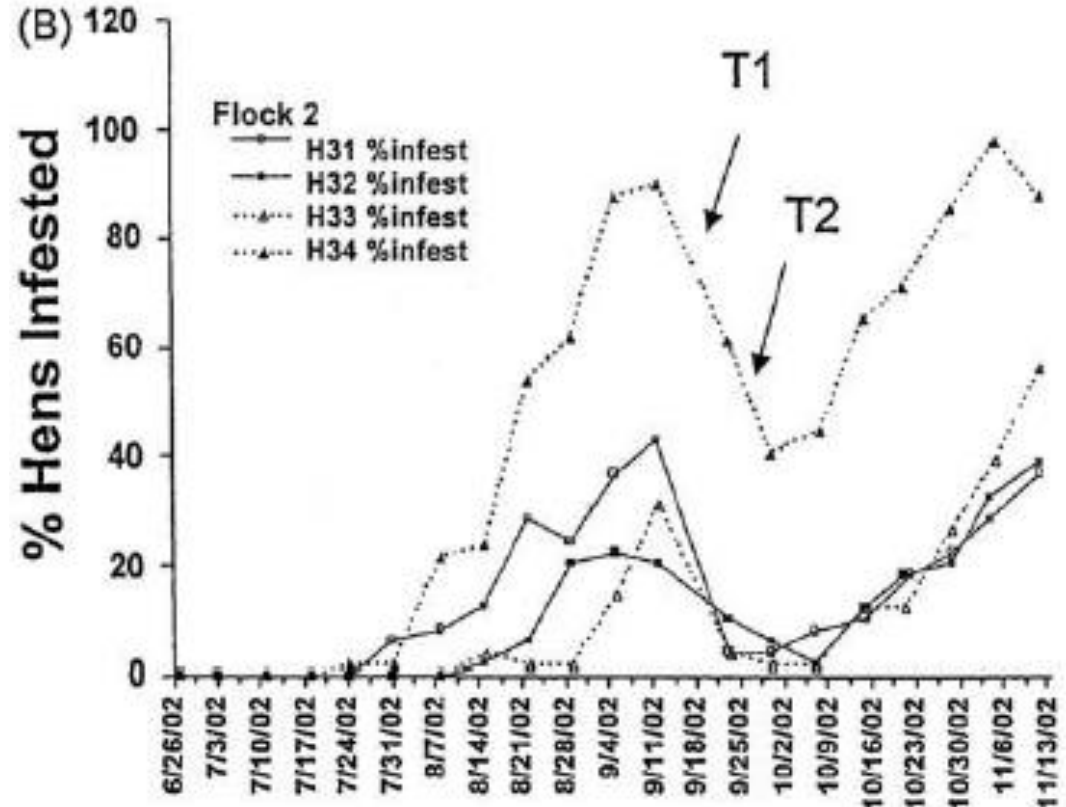
Picture: Murillo 2017



# NFM population dynamics

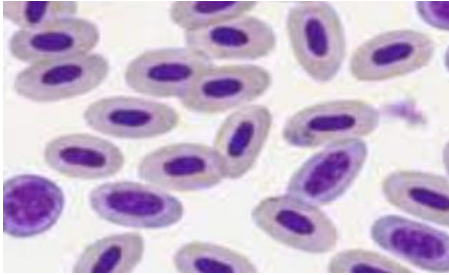


0 = no mites visible, 1 = 1–10 mites, 2 = 11–50 mites, 3 = 51–100 mites, 4 = 101–500 mites, 5 = 501–1000 mites, 6 = 1001–10,000 mites, 7 = >10,000 mites.



Mullens, 2008

# Issues related to NFM infestations



**Anemia**  
(DeLoach, 1981)

**Skin changes**  
(Vezzoli, 2016)

**Immune activation**  
(Burg et al., 1988)

**Behavior changes**  
(Murillo, 2020)



**Decreased egg production**  
(Arends, 1984)


**Decreased feed conversion**  
(Axtell, 1990)

**Decreased egg quality**  
(Vezzoli, 2016)



**\$0.07–0.10 per hen for 10-week peak-mite period infestations.**  
(Mullens, 2009)

**Animal welfare concerns**  
(Murillo, 2020)

A marble bust of the Roman philosopher Seneca, showing him with thick, curly hair and a full beard, looking slightly to the right.

“If one does not know to which port one is sailing, no wind is favorable.”

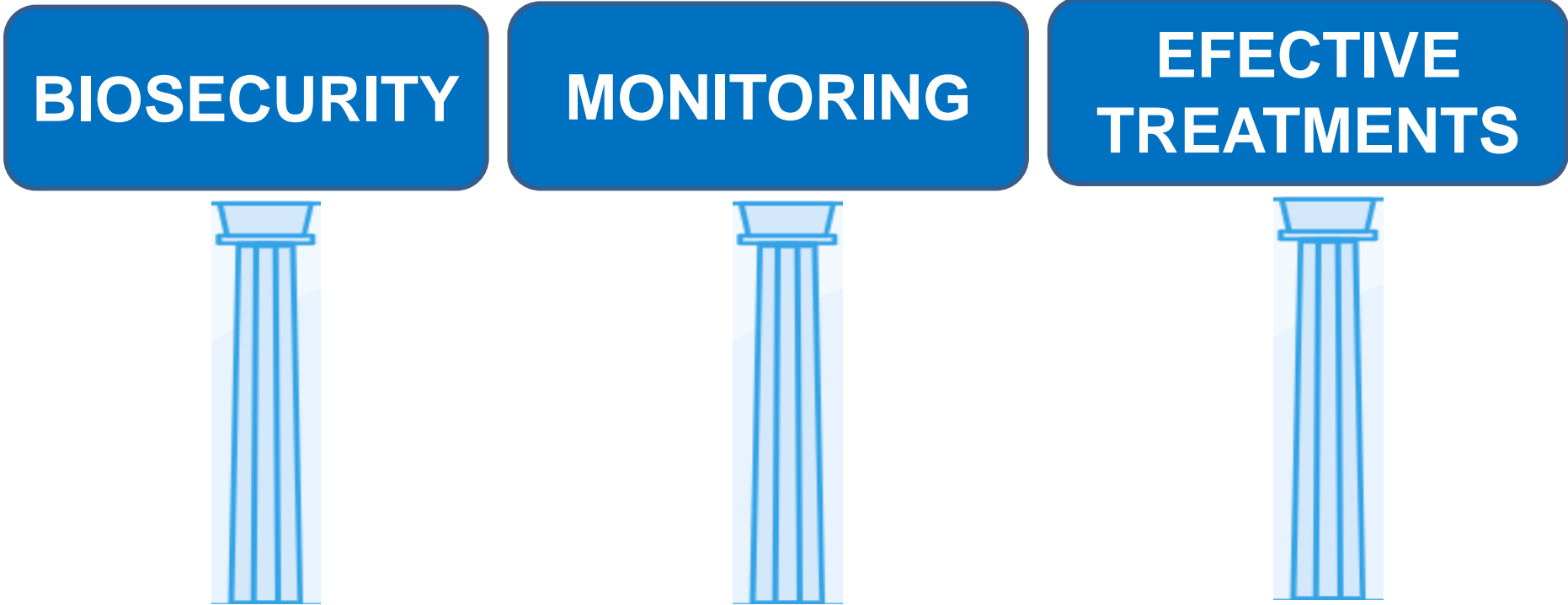
Seneca 4 a.C – 65 d. C

1) Prevention

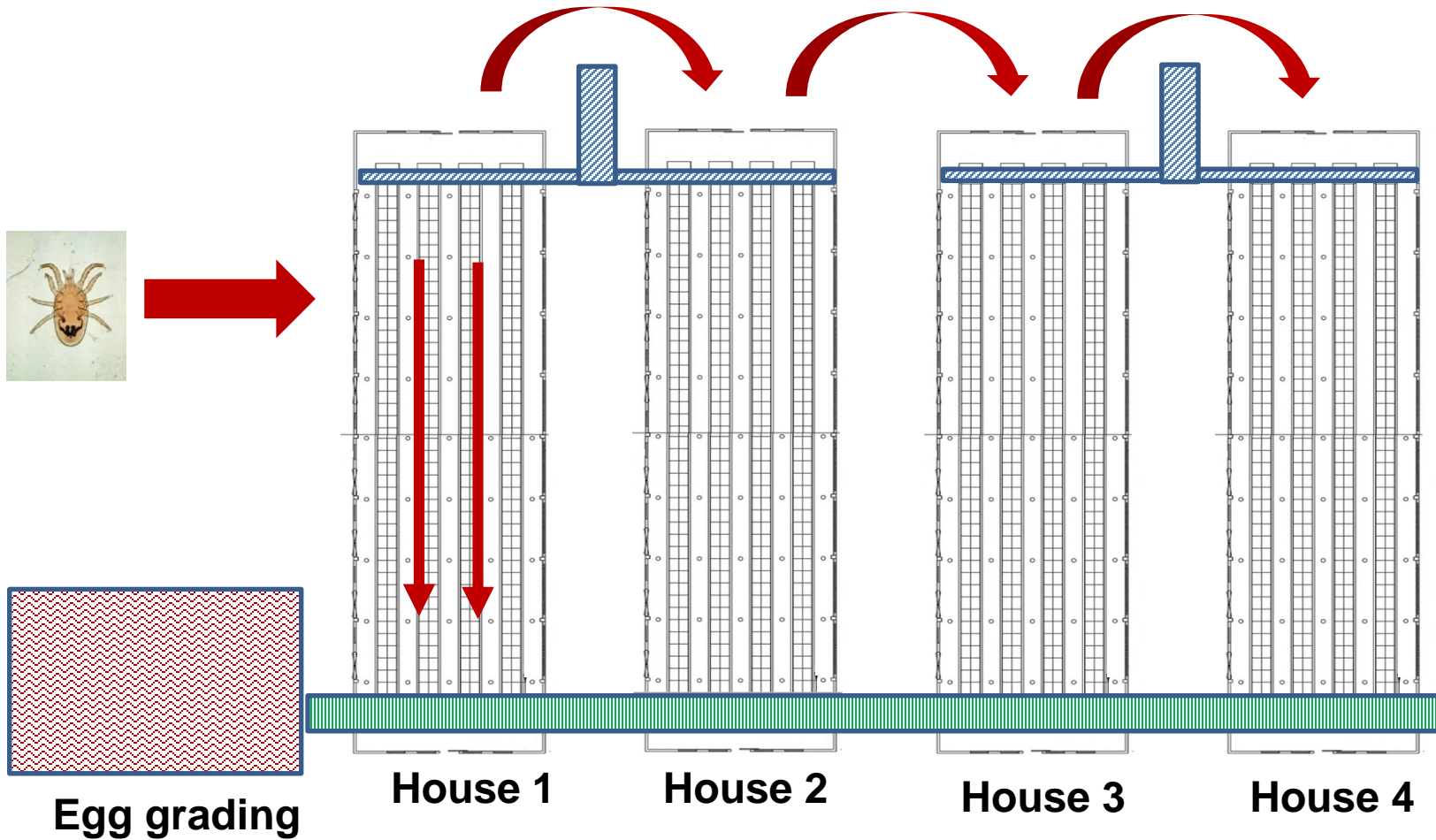
2) Eradication

3) Control

# NFM control program



# NFM introduction and spread in a farm



## Risk Factors

- Visitor ?
- Rodents ?
- Eggs ?
- Manure ?
- Staff ?
- Equipment ?
- Others ???

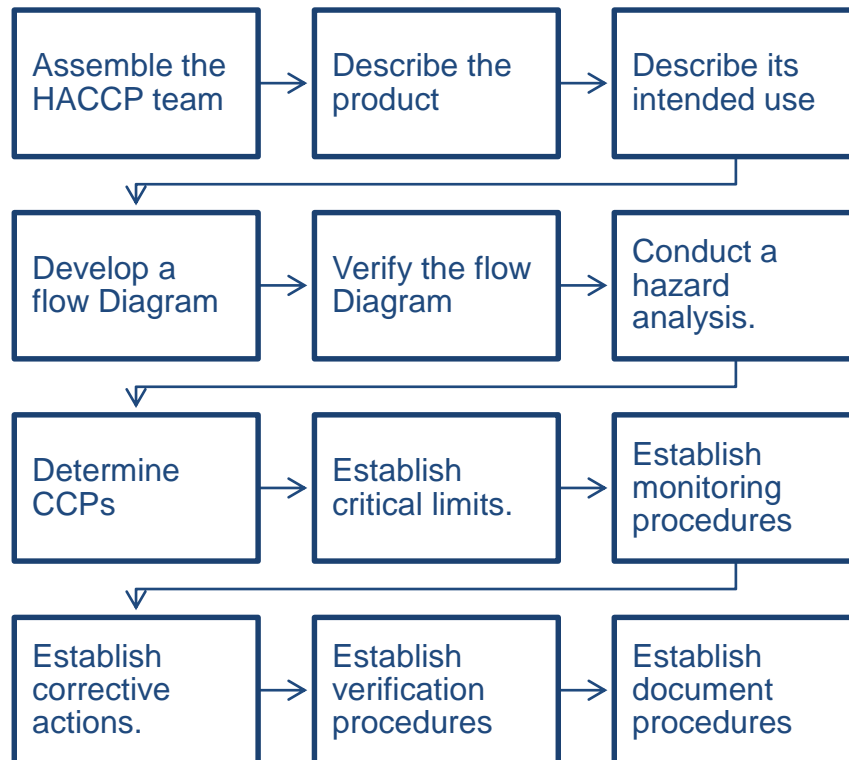


# Using HACCP-based method for NFM control

Exp Appl Acarol (2009) 48:167–181  
DOI 10.1007/s10493-009-9250-6

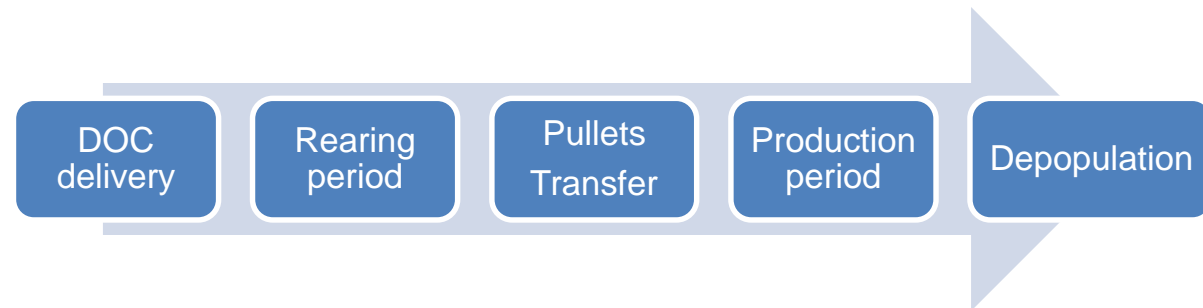
## Preventing introduction and spread of *Dermanyssus gallinae* in poultry facilities using the HACCP method

Monique F. Mul · Constantianus J. M. Koenraadt



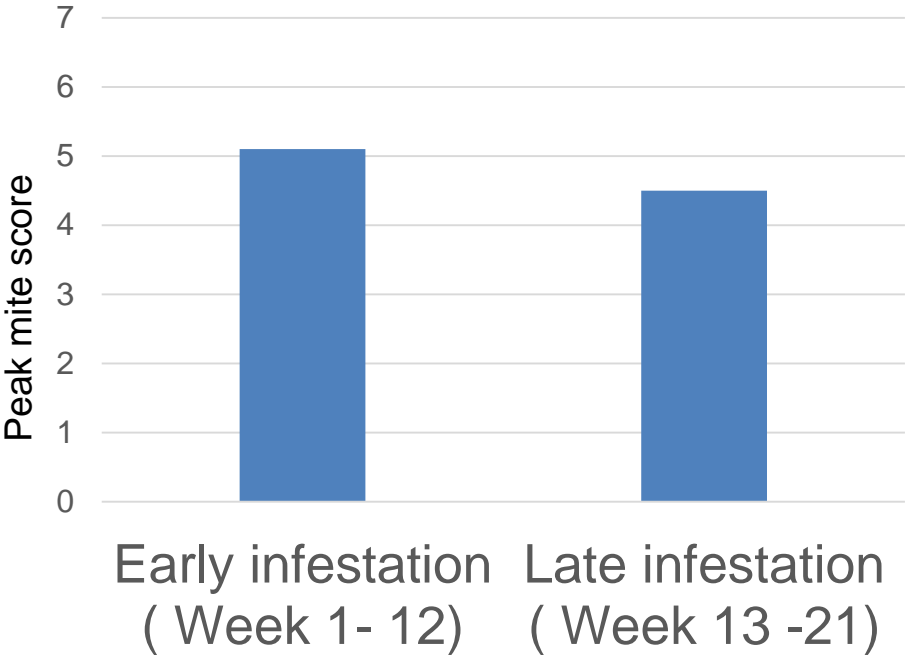
## Hazard Categories

Environment	Manure
Feed	Aeration
Litter	Cadavers
Growing hens	Visitors
Equipment	Farmers
Manure	Ventilation
Eggs	Unproductive hen

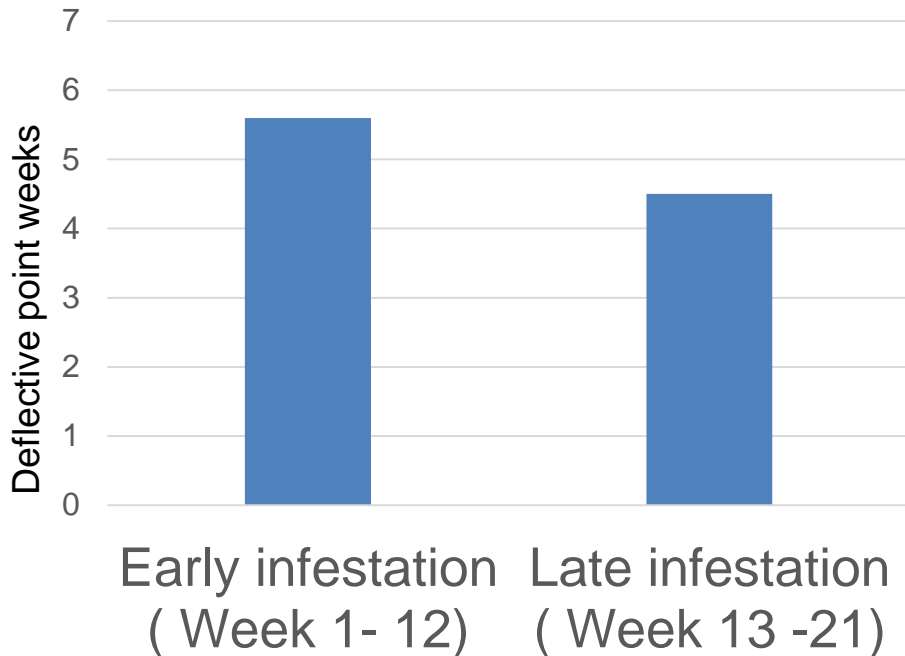


# Why is delaying infestation so important?

### Max. level of infestation



### Time before infestation decline



Mullens, 2008





# NFM monitoring techniques

## Egg



Picture: Murillo 2017

Low infestation level won't be detected

## Individual hens ( vent)



Pictures: Murillo 2020

### No. of sampled birds:

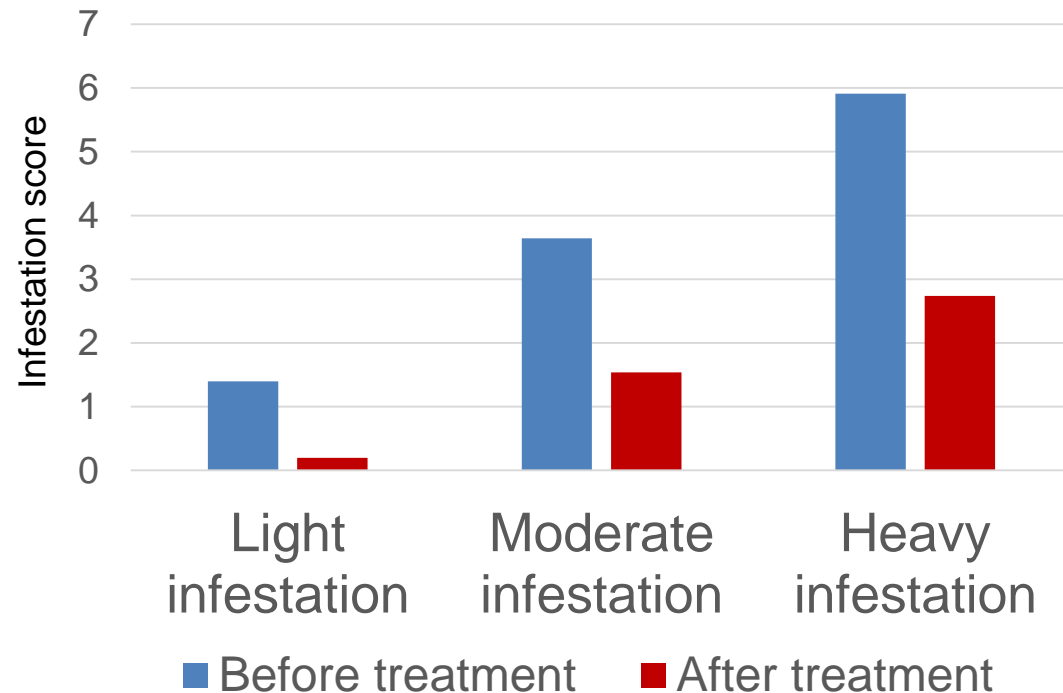
- 0.1-03% of the flock
- Sentinels' birds
- Sequential sampling

### Mites counts:

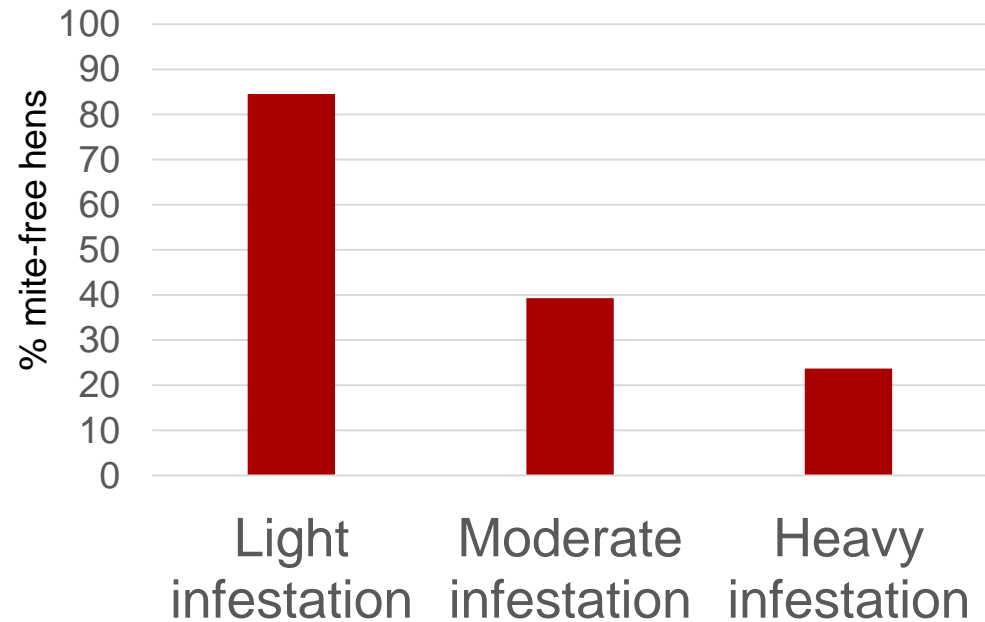
- Just presence/absence
- Semi-quantitative (Score)
- Quantitative

# Why is early treatment so important?

## Average infestation score

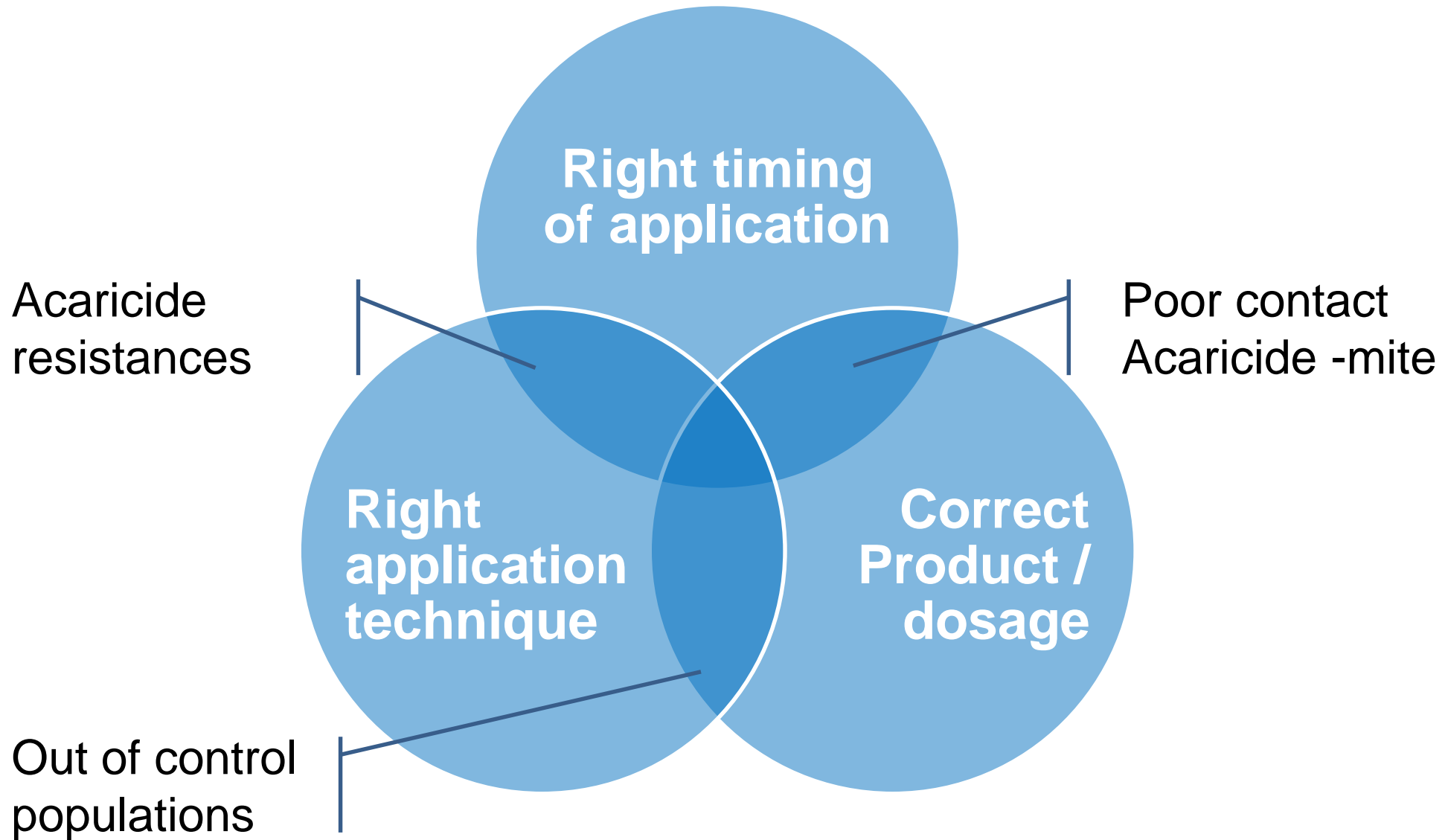


## % Complete treatment

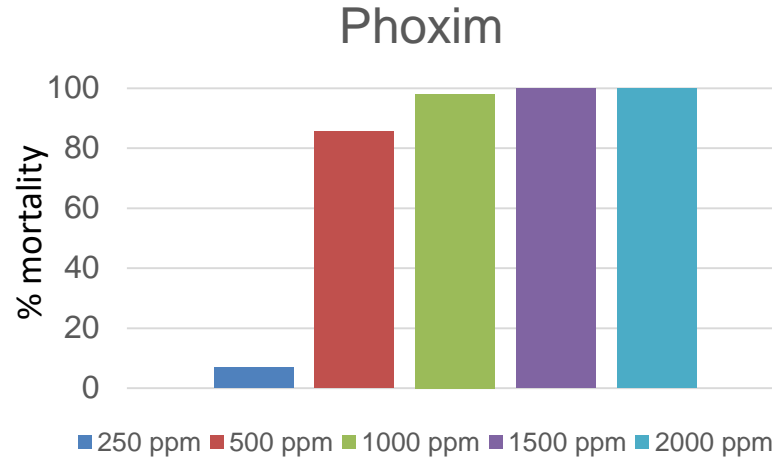
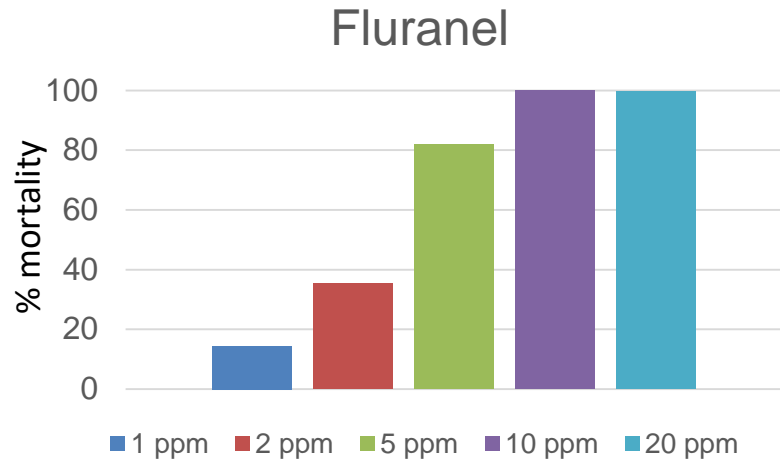


Mullens, 2008

# Characteristics of a correct NFM treatment

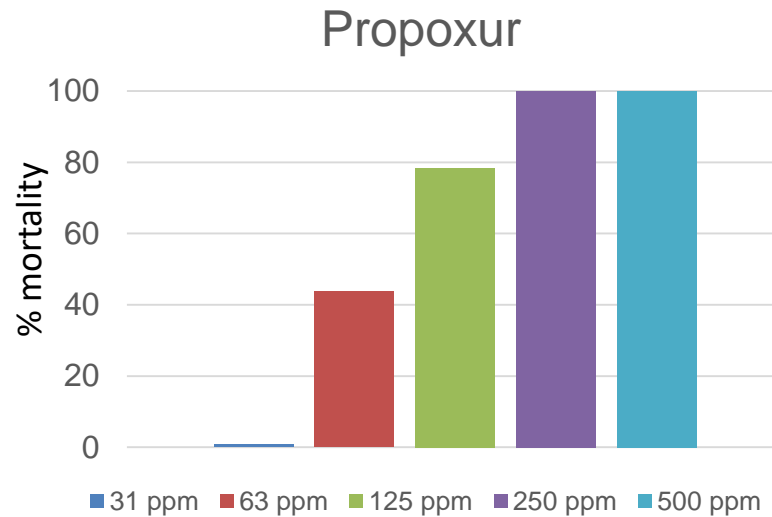
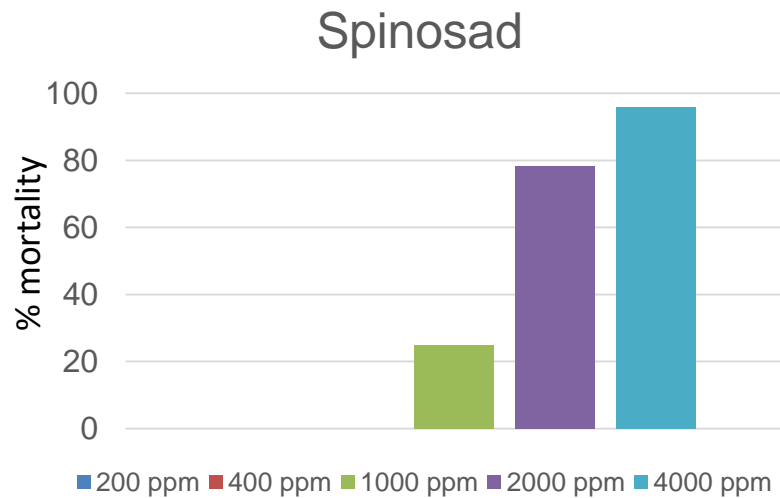


# In vitro evaluation of chemical acaricides



Deltamethrin

Discarded from test  
(1000 ppm 14% mort)



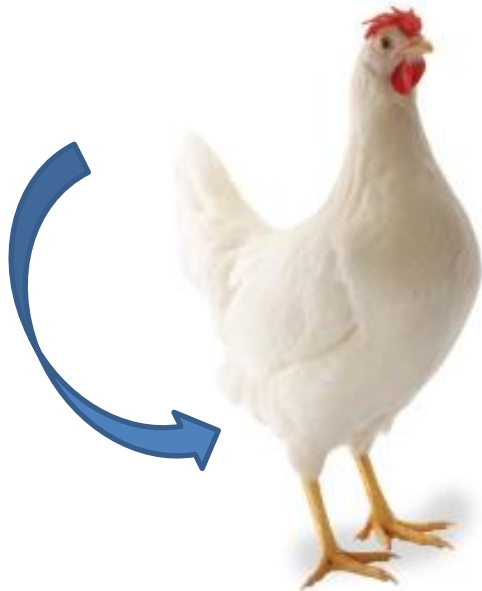
Permethrin

Discarded from test  
(1000 ppm 12% mort)

Mullens, 2017

# Acaricide application technique

Ensure a sufficient coverage of the hen's vent area by direct spraying.



1. Use enough acaricide dissolution.  
( 0.6 -1 gallons / 100 birds\*).

2. Use the correct sprayer equipment

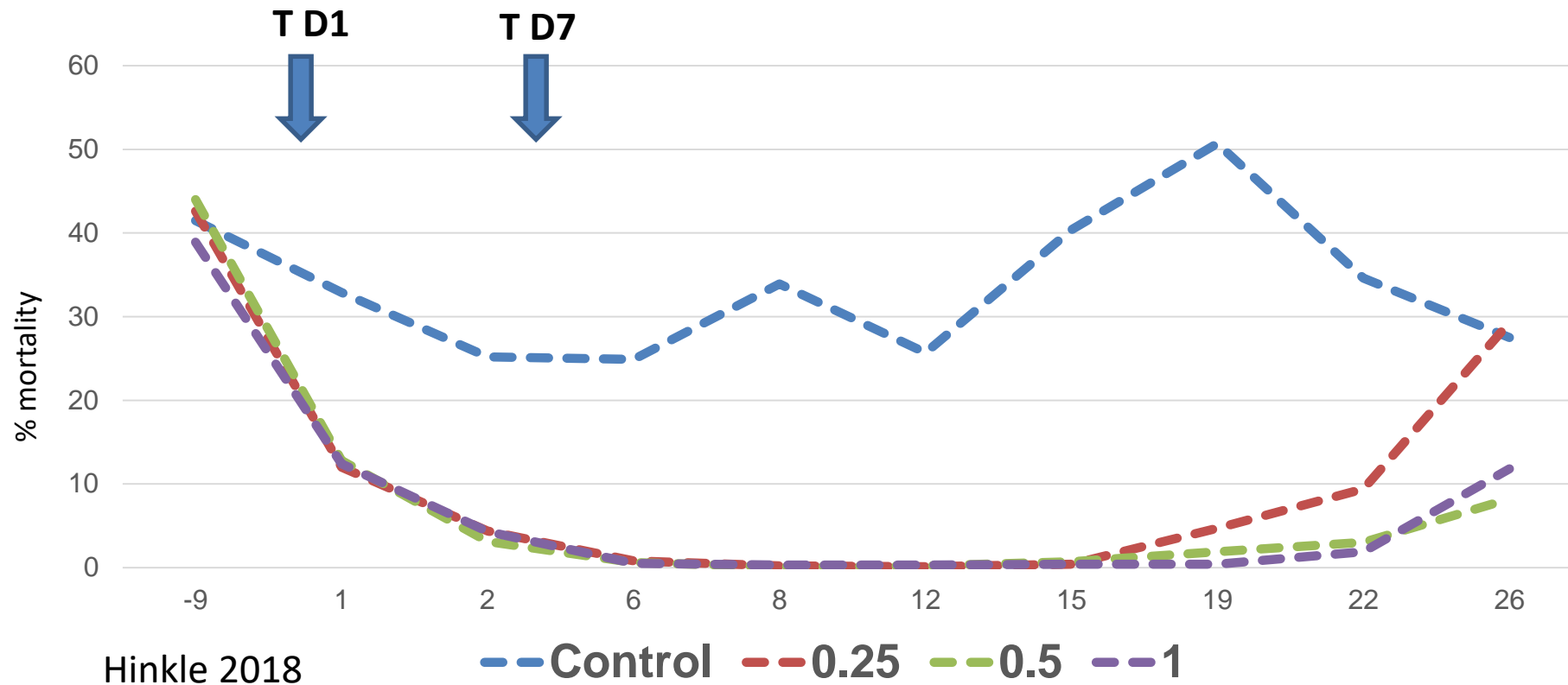
25000 birds house = 150 gallons



\* Ask to your acaricide provider

# NFM treatment by drinking water?

## Oral treatment with Fluranel against NFM



Hinkle 2018

# Treating NFM in cage-free system



Obviously, it is much more complicated in cage systems !!!!

Use the activity of the hens to combat NFM:

🐔 Grooming ( beak treatment)

Murillo 2016

🐔 Dust bath ( Diatomeus earth)

Murillo 2016

# Alternative treatment for mites ??

## PLANT-BASED PRODUCTS

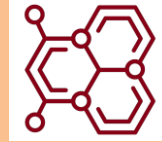


**Plant derived products:** Azadirachtin

**Essential oils:** thymol, carvacrol, eugenol, geraniol

**Repelents:** citronella, D-limonene, eucalyptol

## INORGANIC PRODUCTS



**Silicates gel or dust**

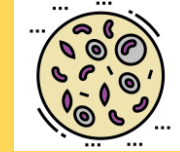
**Diatomea earth**

**Sulphur**

**Sodium bicarbonate**

**Mineral oils**

## BIOLOGICAL PRODUCTS



**Entonopathogenic fungi:** Beuvaria

**Predator mite:**  
Hypoaspis acualeifer  
Androlaelaps casalis

**Vaccines**

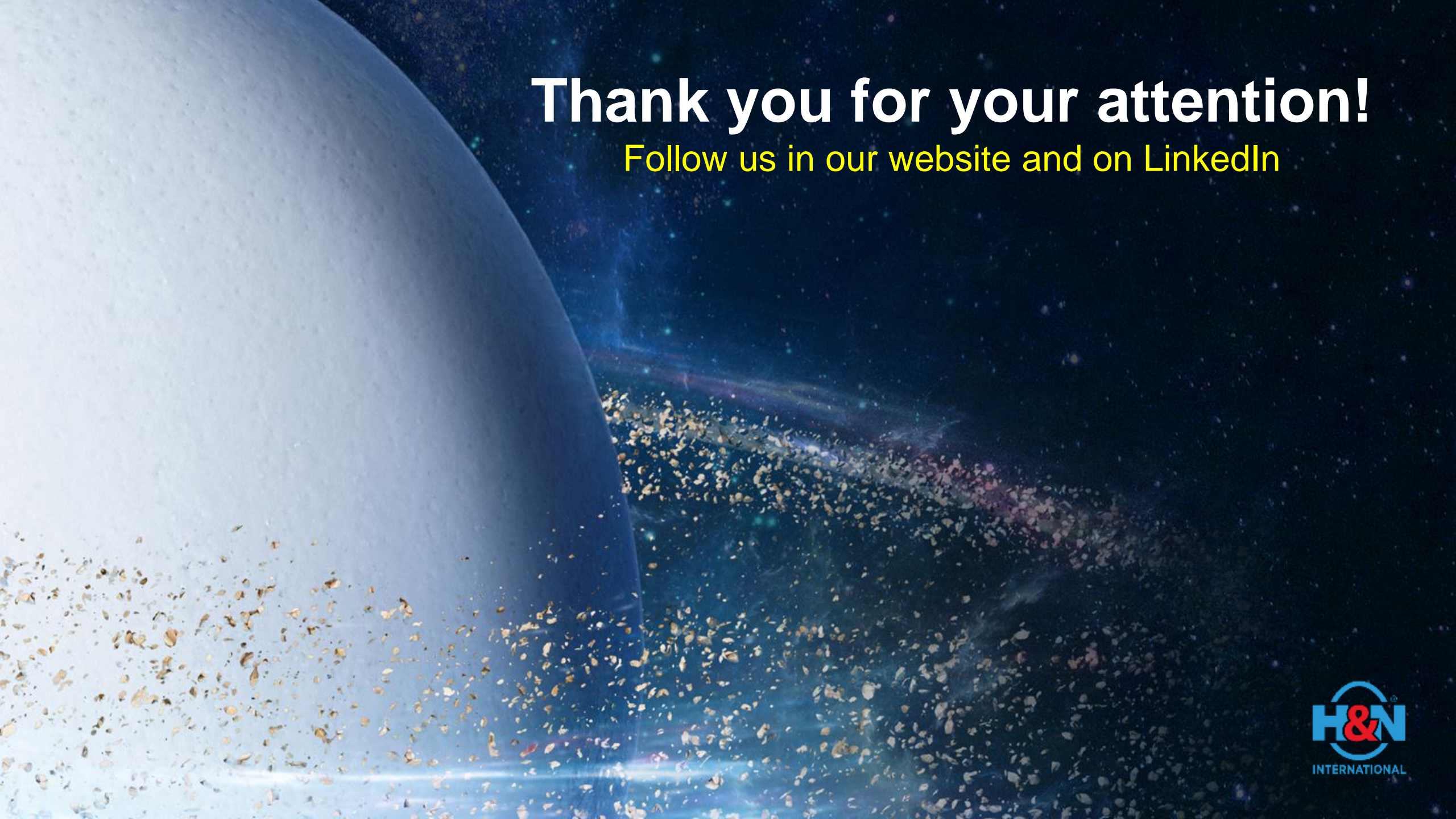


# Take home message

**1.** NFM causes extremely **annoying and costly infestations**. If you **are free** of it, work actively to **remain so**.

**2.** If your farm is infested, start by **limiting the spread of mites** within the farm and by **monitoring mite populations** in your houses.

**3.** Use treatments to **hit the mites hard and early** before they hit your hens.

A space-themed background featuring a large, bright, cratered planet on the left side. The rest of the image is a dark, starry space filled with a dense field of small, golden-brown particles or dust, possibly representing a comet tail or a debris field. The lighting is dramatic, with a bright glow from the planet illuminating the surrounding dust.

**Thank you for your attention!**

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