

Protocol for on-farm monitoring of *Dermanyssus gallinae*

This summary describes the results and shortly some points of discussion of the two sessions of Workshop 2 in Montpellier facilitating the goals of Working Group 2 “One Health”.

The session content was focused on the set-up of a monitoring protocol for on-farm monitoring of *Dermanyssus gallinae*. This summary describes:

1. The monitoring method
2. The frequency and duration of monitoring
3. The places and the number of monitoring places
4. Suggestions for future research

1. Collection of monitoring methods

Remarks about specificity of the above mentioned monitoring tools:

Other species were found in some monitoring tools:

other mites than *D. gallinae* (e.g. predatory mites) (Velcro, early detection method).

No other species found in automated mite counter.

Monitoring method or principle	Reference
1. ADAS© Mite Monitor	Anonymous 2014
2. Perch trap	Kirkwood 1963
3. Tube containing a fabric or cloth	Maurer et al. 1993
4. Corrugated cardboard/plastic trap	Nordenfors et al. 1999
5. A tube trap with a wooden stick (Rick Stick) or corrugated cardboard (Avivet trap)	Van Emous and Ten Napel 2007 Bronneberg (AviVet.nl, personal communication)
6. Method for detecting <i>D. gallinae</i> in dust, feathers and impurities (early detection method)	Pavlicevic et al. 2007
7. Examining dried droppings for presence of <i>D. gallinae</i>	Zenner et al. 2009
8. Mite Monitoring Score (MMS) method	Cox et al. 2009
9. Automated mite counter	Mul et al. 2015
10. Modified trap after Safrit and Arends	Schulz, 2014
11. MTT-Velcro band mite trap	Tuovinen et al. 2010
12. Semi Attractive Trap (SAT)	Chiron et al. 2014
13. Simplified Passive Trap (SPT)	Roy et al. 2014
14. Paper test	Unknown
15. PVC pipe with 13 holes and towel sheet inside	Tucci et al 1989
16. Scout box app	Cropwatch BV
17. Folded paper	Zenner et al. 2009
18. Q-perch counter	Vencomatic, Van de Ven 2016
19. Dog (under construction?)	
20. Lohmann trap	Mozafar 2014

2. Requirements of the monitoring tool for *D. gallinae*

A monitoring tool should be able to:

- Monitor population dynamics
- Monitor spatial distribution
- Detect low numbers of *D. gallinae*
- Determine the effect of interventions
- Provide knowledge about the population on-farm
- Define or determine a threshold

To determine the most favourite monitoring tool, the tools should be checked on:

- Costs
- Durability
- Reliability (which includes: scoring, repeatability, sensitivity, specificity)
- Low handling costs
- Easily implemented in daily management

The two different groups (morning and afternoon session) had different goals:

Group 1. Monitoring should work on-farm and under experimental setting. Monitoring should be done by the farmer. A farm with enriched cages are taken as an example. Automation if available is an advantage. Monitoring during the empty period should not be forgotten.

Group 2. A farmer should be able to monitor the *D. gallinae* population. Monitoring should be executed on layer farms and on rearing farms.

The most favourite method of *group 1* was:

1. Velcro trap
2. Automated mite counter
3. Transparent tube trap

The most favourite of *group 2* was for Layer farms:

- Velcro trap
- Rick stick

The Velcro trap and placing sentinel birds in an empty laying hen house, possibly provides information about the presence of *D. gallinae*.

The most favourite of *group 2* was for rearing farms:

- Velcro trap
- Semi attractive trap
- Rick stick

A suggestion was to develop a new monitoring tool for rearing farms to identify presence of mites, quickly (blood tests?)

Overall the Velcro trap is the most favourite trap of the attendees under all circumstances. It was suggested to give more insight in the method (there is a difference between Velcro with hooks and loops) and the method quality compared with other monitoring methods. Some improvements were suggested; 1) improve the method so the trap could be in the farm for the duration of one week (for practical implementation reasons), 2) develop a scale method for farmers to easily identify the population dynamics, 3) develop a method for automating the counting of the Velcro trap.

3. Frequency and duration of monitoring

During a sticker session the attendees pointed out the most favourite **frequency** of monitoring (meaning monitoring should be repeated or carried out every day, week, two weeks, month, half a year or once a year) and the **duration** of the monitoring (meaning the time length the monitor should stay in place before it is removed or replaced)

Group 1. suggested for monitoring on farm a two weekly interval and in experimental setting a weekly interval. The duration should depend on the method. Each method has its preference for the duration of the monitoring.

Group 2. advised for practical reasons and for good implementation in the daily management to monitor every week or every two weeks. The duration of the monitoring should be as long as the frequency; one or two weeks.

Overall, the attendees agreed on monitoring with a weekly or a two weekly interval and for a duration of respectively one or two weeks. However, the monitoring method prerequisite the duration of monitoring.

4. Places to monitor and number of monitoring places

The attendees of the two groups decided upon the places where to monitor and the number of places to monitor the *D. gallinae* population. As suggested by Olivier Bruno this depends upon many different parameters. A good “sampling plan” should be developed with the current available knowledge.

During the session of *Group 1* it was quickly decided to monitor on a cage farm on all sites of each row except on the site near the air inlet, but further evenly distributed with three or four alternating monitoring places on each site of a row. Monitoring should at least be executed at the highest cage level and at the middle cage level. Preferably also monitoring at the lowest cage level should be executed.

In a layer facility with an aviary system the monitors should be placed on the top perches of all rows. Preferably, also monitoring at the lowest cage level should be executed.

Group 2 focused more on the feasibility of the monitoring by a farmer in an aviary system. Some advised to work in alley's and hang at easy reachable places at 3 to 4 per site of the row. The monitors were placed in alternating way. Others suggested to place them at a reachable high level and a lower level. This group did not mention to avoid monitoring places at the sites of the rows near the air inlet.

5. Suggestions for future research:

- Comparison of the methods. Even though the most favourite method was picked, the attendees were unable to compare the method as most of the methods were not validated or compared with other methods.
- New monitoring tool for rearing farms to identify the first mite / presence of mites (PCR/ serological tests, other)
- Monitoring methods to be developed for during the empty period (e.g. sentinel birds, attractive traps)
- Finding attractants for *D. gallinae* to find the first mite and improve monitoring
- Set up of a sampling plan for monitoring *D. gallinae* in different housing systems
- Set up of monitoring protocols made for different situations? (e.g. on farm, experimental, aviary, enriched cages,...)
- Develop methods for automatically counting the traps with plastic/ corrugated cards board/ Velcro trap/ ..
- Easy identification method for detecting *D. gallinae* and distinguish it from other mites.

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